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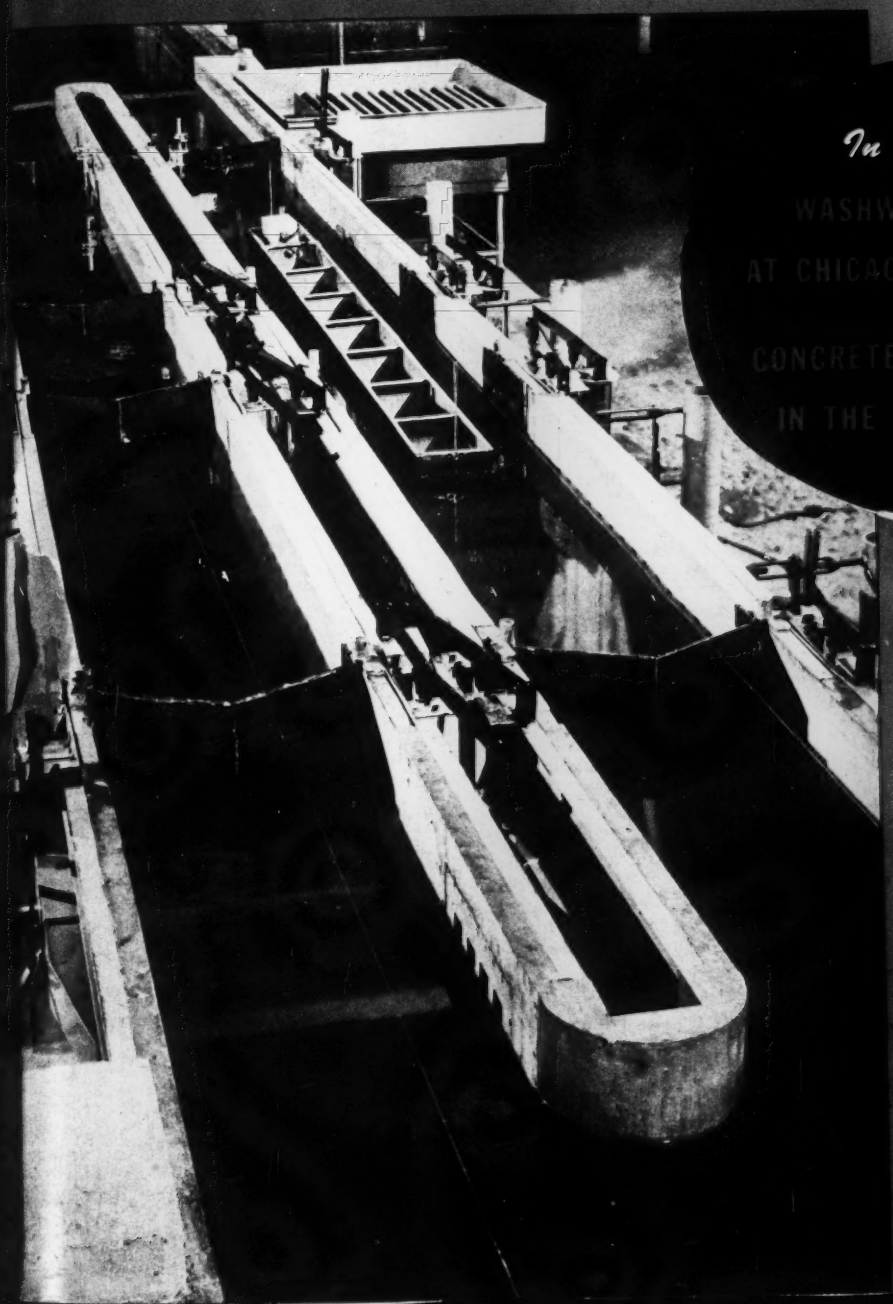
ENGINEERING NEWS-RECORD

JUNE 28, 1945



In This Issue

WASHWATER TROUGHS AT CHICAGO'S FILTER PLANT

•

CONCRETE BUILDING DESIGN IN THE U. S. AND BRAZIL

Model of Sayreville ship and barge lock for investigating salinity control in proposed New Jersey Ship Canal.

Construction of this twin-arch bridge near Moorestown, N. J., was simplified and speeded through use of ARMCO Multi Plate. Each arch has a span of 22 feet and is 40 feet long.

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WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Publisher*

Vol. 134 JUNE 28, 1945 No. 26

COMING NEXT

• The engineering and construction problems involved, and how they were solved, in restoring 7,000 miles of railroad service from the Normandy beachhead up to the Rhine will be featured in the July 12 and July 26 issues. This work, carried out by U. S. Army Engineers, consisted largely of bridge building and reconstruction of marshalling and transfer yards. How well our engineers and construction battalions succeeded in keeping the Allied army supply lines open to the Western Front, as told by Waldo Bowman, editor of *ENR*, is a story of unparalleled achievement in military operations.

• Paving for the biggest planes in sight, now being laid at Moffat Field, Calif., consist of concrete slabs 9 to 18 in. thick and capable of sustaining concentrated wheel loads of 175,000 lb. (half of the total for a 175-ton plane). The paving is being constructed on a well compacted base of 24 in. thickness for the warming-up aprons, where greatest vibration occurs. Dowels 2 in. in diameter on 12-in. centers are used across joints between slabs. These and other design features will be described in the July 12 issue.

• Earthquake-resistant design is but one of the distinguishing features of the buildings comprising the new Tripler General Hospital, which the Army now has under construction in Hawaii. The use of rigid-frames, reinforced concrete construction, tied foundations and the subdivision of buildings into structurally isolated units have all been incorporated in the design. Likewise, the use of wide, shallow concrete beams, 72-in. wide and only 20 in. deep, is of interest. The project will be described in the July 12 issue.

LOOKING AHEAD

• Seabee "know-how" in meeting water supply problems on islands in the Pacific has been an important element in advancing our military gains. Some of the experiences of Construction Battalion units that began with the invasion of Guadalcanal will be told in an early issue by John L. Sherrill, Chief Ship Fitter, who can proudly state that none of the groups with which he worked failed to produce adequate water supplies at every landing.

PAGE

The Week in Engineering and Construction 53
Comment and Discussion 59
Editorials 62
Railroad Bridging in the E. T. O. ..... WALDO G. BOWMAN 64
Carbon Monoxide Control in Vehicular Tunnels .... G. I. SAWYER 70
Special Equipment for Painting Highway Center Stripes 72
Pile Test Justify Increased Loading ..... W. A. KING 73
Housing and Urban Development Legislation 75
Steel Forms Speed Concrete Washwater Trough Construction ... 76
Concrete Building Design in U. S. and Brazil .... ARTHUR J. BOASE 80
Interpretation of Bid Data Responsibility of Bidder 89
Model Tests Salinity Control in N. J. Ship Canal 90
Road Cuts Wider at Bottom Than at Top in Tulagi Island 93
Precise Leveling Equipment .... M. T. JONES AND O. J. MARSHALL 94
From Field and Office 96
Unit Prices 98
Elections and Activities 102
Manufacturers' Activities 104
Manufacturers' Publications 110
New Aids to the Constructor 112
Construction Reports 155

Number of copies of this issue printed: 36,023

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Due to the paper shortage, no index for volume No. 134 (Jan.-July, 1945) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below.

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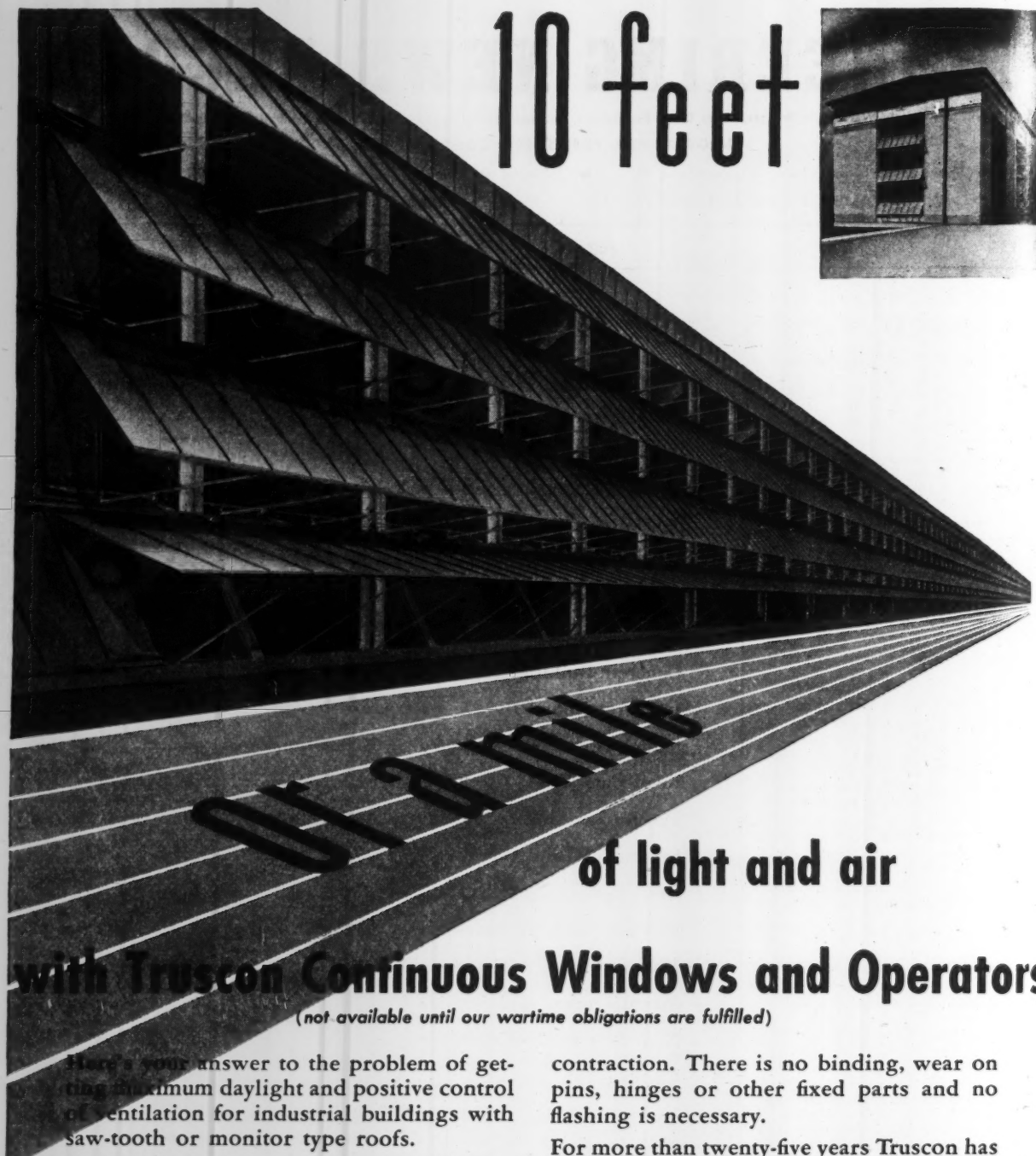

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Postwar Planning Progress Report

ENGINEERING PROJECTS proposed for construction in the postwar years total $21,087,437,000 for the 29-month period from January 1943 through May 1945. Of this identified and recorded proposed volume, engineers and architects, or both, have plans under way or completed on projects valued at $9,040,565,000, 43 percent of the overall total as reported to *Engineering News-Record*.

Postwar construction projects ready for bids with plans completed and land, legal and financing problems settled total $713,490,000 for the 29 months. Projects with financing available but planning unfinished are valued at $630,902,000, bringing the total of financed work to $1,344,392,000, 14.9 percent of the planning stage total. In addition, plans are completed on $385,966,000 worth of postwar construction, but lack of financing is holding up this volume.

On a per capita basis (1940 census), the 29-month proposed postwar total would represent an investment of $160.30 per person in continental United States. Planning stage volume, on the same basis, would represent an investment of $68.60 per person.

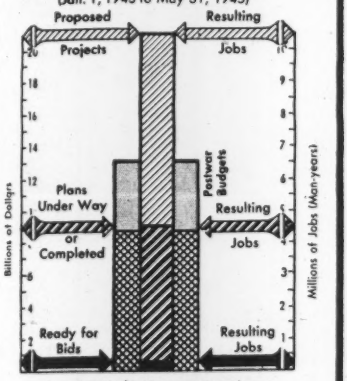
Eleven states and the District of Columbia report higher proposed and planning stage per capita averages than those recorded for the country as a whole. These are the same states reported in April, except that Illinois has now climbed into this high-ranking group by virtue of $264,911,000 in proposed work and $257,773,000 in planned projects added in May.

Three states—Delaware, Florida and Ohio—are above the U. S. per capita average for projects with plans under way or completed. Delaware joined this group as a result of the $25,000,000 bridge project reported in the planning stage during May.

(*Postwar Project Reports page* 118)

POSTWAR ENGINEERING CONSTRUCTION VOLUME PROPOSED, PLANS UNDERWAY OR COMPLETED, AND READY FOR BIDS

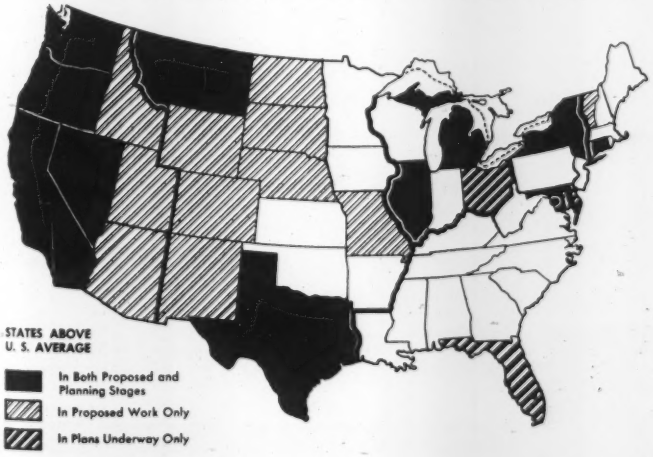
Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year (Jan. 1, 1943 to May 31, 1945)



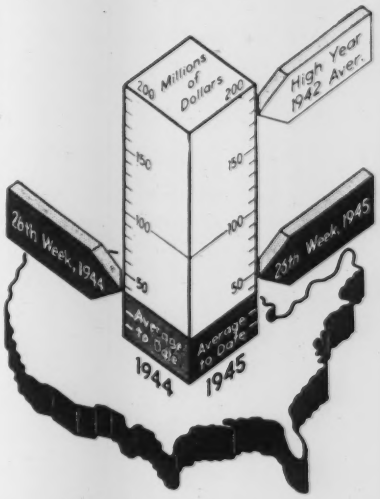
(Assuming that $1 of construction volume produces 1 man-hour of labor, ⅓ on site)

HIGHEST RANKING STATES IN POSTWAR CONSTRUCTION PLANNING

As Reported to *Engineering News Record* from Jan. 1943 through May 1945



CONSTRUCTION ACTIVITY



As Reported This Week to... *Engineering News-Record*

CONTRACT VOLUME

Continental U. S. Only (Thousands of Dollars)

	Week of June 28 1945	Cumulative 1945 (26 wk.)	Cumulative 1944 (26 wk.)
Federal	$21,721	$487,306	$580,913
State & Municipal	10,129	131,994	109,436
Total Public	$31,850	$619,300	$690,349
Total Private	14,690	256,855	201,481
U. S. Total	**$46,540**	**$876,155**	**$891,830**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1945 (26 wk.)	Cumulative 1944 (26 wk.)
Waterworks	$1,125	$19,797	$13,975
Sewerages	844	14,623	13,629
Bridges	301	12,884	6,748
Highways	8,821	94,212	97,637
Earthwork, Waterways	3,224	19,871	32,691
Buildings, Public	4,820	305,727	333,624
Industrial	11,763	180,751	83,000
Commercial	2,190	44,290	88,541
Unclassified	13,452	184,000	221,985

NOTE: Minimum size projects included are: Waterworks and waterway projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1945 (26 wk.)	Cumulative 1944 (26 wk.)
NON-FEDERAL	$288,741	$198,011
Corporate Securities	79,670	85,345
State and Municipal	186,471	56,536
RFC Loans	22,600	56,130
FEDERAL	$251,010	$245,266
Total Capital	**$539,751**	**$443,277**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	June '45	308.99	148.53
Building Cost	June '45	239.37	129.40
Volume	May '45	93	41

For the road ahead...

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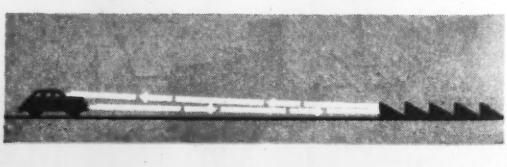

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JUNE 28, 1945 • VOLUME 134 • NUMBER 26

Contract system changes due to price conditions

Corps of Engineers return to bidding methods prescribed by the Army Service Forces because of cost of work let by unnegotiated contract

The probability that the present scarcity of construction materials and labor will make it necessary for contractors to bid high to protect themselves against unforseen contingencies was a major factor in the decision of the Corps of Engineers to require all district engineers to negotiate contracts for civil work (*ENR* June 7, vol. p. 793). This fact was brought out last week in further discussion of the subject with Lieut. Gen. Eugene Reybold, Chief of Engineers. General Reybold's response to our first inquiry (*ENR* June 21, vol. p. 861) appeared to relate to "contracts for war procurement", whereas the work on which public letings had been stopped was civil work that had been authorized as being of benefit to the war effort. Extracts from General Reybold's statement concerning the latter work are given below:

Negotiation required

"It is true, as you state, that Directive No. 2 of the War Production Board covers only contracts relating to war procurement. However, all civil works projects now being authorized are authorized on the basis that they are in the interest of the war effort. In any event the technical services of the Army Service Forces, which include the Corps of Engineers, are governed by War Department Procurement Regulations, which regulations also cover civil works procurement and construction activities. Paragraphs 240, 240.1 and 240.2 of Procurement Regulations are as follows:

[240] *Method of contracting.*

[240.1] *By negotiation.*—Except as provided in paragraph 240.2, *all contracts and purchases* made by the War Department will be made by negotiation under authority of the First War Powers Act, 1941, and Executive Order No. 9001, and in accordance with these procurement regulations. (Italics supplied by writer.)

[240.2] *By formal advertising.*—When authorized by the director, Purchases Division, Headquarters, Army Service Forces, contracts may be placed by formal advertising instead of by negotiations if deemed necessary in the interests of the government.

How contracts are handled

"Implementing War Department Procurement Regulations with respect to both military and civil construction contracts Chapter VII, Orders and Regulations, Corps of Engineers, provides as follows:

702.02 • • • *b. By Negotiation.*—PR 240.1 directs that all contracts and purchases made by the War Department will be made by negotiation under authority of the First War Powers Act, 1941, and Executive Order No. 9001.

702.02-A *Contracts Generally.*—In negotiating contracts ordinarily quotations will be solicited from the largest practicable number of responsible contractors and awards will be consistently made to the contractor submitting the lowest quotation. The award, however, will be made pursuant to negotiation and the contracting officer will select the contractor whom he has determined to be in all respects the best qualified to perform the contract in a manner that will be in the best interests of the government. In determining the largest practicable number of contractors from whom quotations should be solicited, or in special cases in determining that quotations should not be solicited, due consideration will be given to the need for immediate delivery or performance, directives of higher authority, and to policies with respect to the placing of contracts in labor shortage areas and with respect to smaller war plants set forth in PR No. 2. In any case where competition is not obtained or award is made to other than the low bidder the official record file will contain the reasons in justification thereof.

"The foregoing regulations have been in effect in substantially the same form since 4 May, 1942.

"Aside from the mandatory aspect of the above quoted regulations it is the view of this office that the method of awarding contracts by negotiation is the only sound and feasible method *while war conditions prevail.* The necessity for the abandonment of the former peacetime award procedure and the adoption of the negotiation procedure was recognized and authorized by Congress as the only practical way of being certain that competent and capable contractors would be obtained and con-

(*Continued on next page*)

General Reybold cuts the Engineers' anniversary cake

On June 16, which was the 170th anniversary of the establishment of the Corps of Engineers, a celebration and dance were held at the Hotel Statler, Washington, D. C. Pictured above is Lieut. Gen. Eugene Reybold, Chief of Engineers cutting the mammoth birthday cake with a dress sword.

Left to right, are General Reybold, Mrs. Reybold, Maj. Gen. Thomas M. Robins, Deputy Chief of Engineers, Miss Ida Lupino, star of stage, screen and radio, guest of honor, and Lieut. Col. Williams H. Press, committee chairman and chief of the office service branch, Office of the Chief of Engineers.

struction begun immediately and completed on time. To permit public opening of bids and the peacetime procedure of awarding contracts would seriously hamper the flexibility so essential in wartime in selecting and obtaining contractors who are known to be qualified and at the same time permit the negotiation of fair and reasonable prices and the elimination of all unwarranted contingency items.

Bids reduced by negotiation

"In negotiating contracts, the contracting officer can, in many instances, eliminate items of contingencies by assisting the contractor in obtaining labor, materials and priority assistance. The belief that some contractors have been inclined to bid high is borne out by the fact that the negotiated price is lower than the first offer. Where bids are opened publicly, the feasibility of the negotiation is largely lost once the contractor knows what the other offers and the government estimate are and how his offer compares therewith. The experience of the Office of the Chief of Engineers shows numerous instances where the low bid has been excessive and has been reduced after negotiation."

Some public contracts

Due to misunderstandings on the part of some district engineers that these regulations applied to civil works, bids on civil works authorized to aid the war effort were called and contracts were let in a manner closely approaching that of normal times. However, when some of the contracts came to be examined by the Purchase Division of the Army Service Forces, it was found that prices were higher than in negotiated contracts and that large items to cover contingencies were included. This resulted in instructions being issued on May 15 to division and district engineers to put all work, both civil and military, on a negotiated basis. Public bids now can only be called on authority of the director of the Purchases Division, A.S.F.

Low bidder preferred

Bids are asked from a selected list of contractors known to be fully qualified to undertake the work promptly, and when these are in the district, engineers are required to begin negotiations with the low bidder. Award of the contract must be made to him unless a satisfactory figure cannot be reached by negotiation. Awards to higher bidders cannot be made without specific authorization from the Chief of Engineers.

After an award has been made, the name of the successful bidder and the amount of contract are made public with names and bids of other offerers.

Brooklyn-Staten Island vehicular tunnel

As soon as financing can be arranged, the New York City Tunnel Authority is ready to proceed with construction of a 4-lane vehicular tunnel under "The Narrows" of lower New York harbor to connect Staten Island with Brooklyn. The tunnel is expected to cost $62,000,000, plus $11,500,000 for engineering, financing and real estate. It is estimated to have a potential traffic of 6,000,000 vehicles the first year, increasing gradually to 16,000,000 vehicles. On a basis of tolls ranging from 40 cents for cars to $1.15 for trailer trucks, the cost of the tunnel would be entirely liquidated in less than 40 years.

According to Ole Singstad, chief engineer of the tunnel authority, the construction can be completed in five years, the first of which would be required for preparation of final plans. Sand and silt underlie the site at a depth of 60 to 90 ft. below the water. Construction by the trench method is recommended.

Sketches of the proposed work will appear in a forthcoming issue.

• • •

Anti-road tax diversion law up to Texas voters

A constitutional amendment dedicating permanently for highway purposes all taxes collected from road users was submitted to the voters of Texas by the Legislature which adjourned this month. The measure will be voted upon at the general election in November, 1946.

The Texas Good Roads Association endorsed the proposal, as did Gov. Coke Stevenson and some officials of the highway department. If adopted by the voters, the result will be to earmark for highway construction and maintenance under the State Highway Department the $30,000,000 a year income from gasoline taxes. The department now receives only 50 percent of the tax, public schools 25 percent, and the remaining 25 percent goes to retire local bonds issued for construction of highways which the state subsequently took over for maintenance. Assumption of additional bonds would be prohibited under the constitutional amendment, making about $10,000,000 more ultimately available annually for state road use.

A bill to increase the retail gasoline tax from four to five cents a gallon failed in the Senate after passing the House. Income from the extra tax would have been used for building lateral roads. The highway department has announced a $60,000,000 program of lateral road building for the first three postwar years.

Surveys to be made for Cascade Mtn. tunnels

One of the most controversial subjects in the state of Washington for over two decades, the construction of vehicular tunnels through the Cascade Mountains to link western and eastern Washington, has been brought out of administration files with two $100,000 legislative appropriations for surveys.

Under the appropriations, surveys of two different routes that would provide more economical motor transport routes than present highways through the mountains are scheduled.

One proposed route involves a bore 29 miles long. The highest point would be only 1,100 ft. above sea level. Located between Skykomish, east of Seattle, and Leavenworth, the tunnel would cost about $40,000,000 and would shorten the present route between Seattle and eastern Washington by 70 miles (*ENR* June 10, 1936, p. 855).

The second route, involving a climb to a much higher level, is under Chinook Pass, close to Mount Rainier, between Greenwater and Caldwell. A tunnel on this location would be 1¾ miles in length. The project as a whole would cost about $15,000,000. Under the bill appropriating funds for this latter survey, the Washington Toll Bridge Authority is authorized to proceed with construction of a toll tunnel if the project is found to be feasible.

• • •

House approved more Lanham Act funds

A bill authorizing the appropriation of an additional $30,000,000 to be spent by the Federal Works Agency under the provisions of the Lanham Act for public works in war-impacted areas has been approved by the House. The additional $30,000,000 is wanted for proper operation and maintenance of public service facilities—primarily schools—in war areas. The new appropriation, plus unallotted and unappropriated monies, would make available for community projects about $40,000,000 in the fiscal year 1946 (*ENR* June 7, 1945, vol. p. 794.)

The city of Toledo, Ohio, has plans for at least $26,000,000 in postwar projects, including streets, sewers, and public buildings, according to a preliminary report by George N. Schoonmaker, city manager, and Clayton L. Piper, city engineer. Some plans are completed and others under consideration. The city will need state and federal government aid, according to the council's public works committee.

Boston enlarges airport for postwar traffic

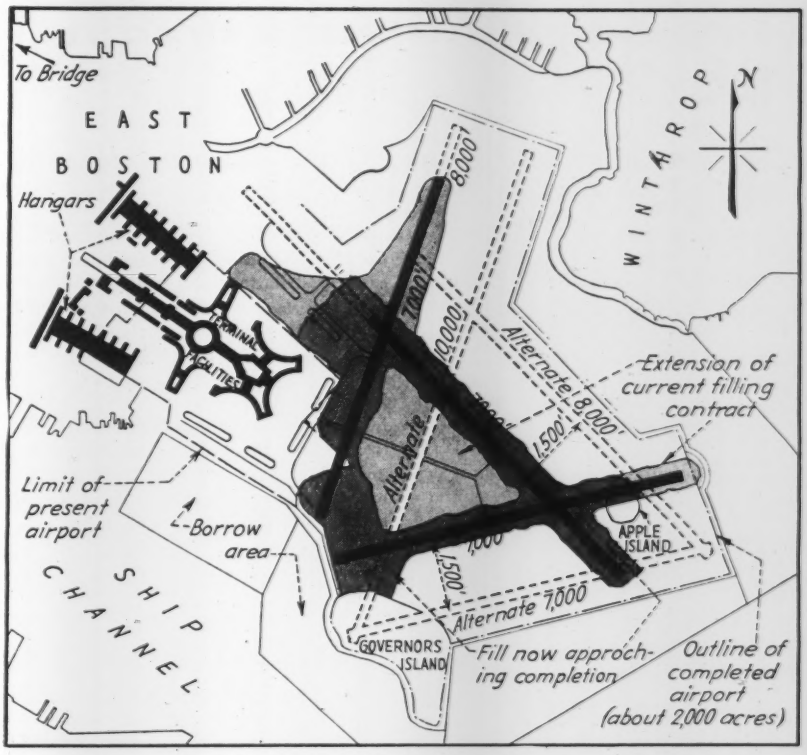
The Commonwealth of Massachusetts recently appropriated an additional $15,000,000 to continue work on a major enlargement of the East Boston Airport. Eventually the airport will be about 2,000 acres, nearly all of the land reclaimed by hydraulic fill from shallow water of Boston Harbor. The present 300 acre airport will become the terminal and hangar area of the completed unit. There will be six major runways, one 10,000 ft. long.

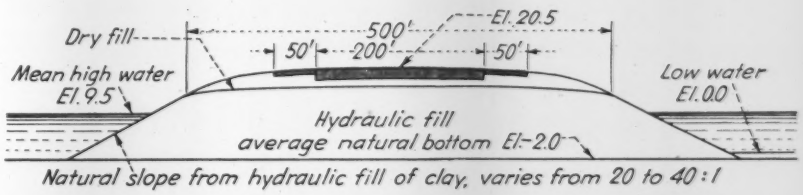
The airport originally was built by the city of Boston but it has been taken over by the Commonwealth. Expenditures to date by the state, including payments to the city of Boston, total about $10,000,000. This includes some 18,000,000 cu. yd. of dredged fill now being completed by Gahagan Construction Corp. at a cost of about $4,000,000. Fill is being placed only in the runway areas to secure the greatest amount of usable space for the expenditure made.

The $15,000,000 recently appropriated will be used to add dry fill and paving on the runways and to extend the fill. Some 12,000,000 cu. yd. of hydraulic fill will be added immediately, under a $3,000,000 extension of the Gahagan contract. An additional 8,000,000 cu. yd. of fill will be placed a little later.

Investigation of bearing power of the hydraulic fill is now under way to determine the extent and type of subbase necessary to suport the paving. It is expected that sand, gravel and broken stone will be used to a depth of about 4.5 ft. and that the runways will be paved with bituminous material pending final stabilization of the fill.

Work on the airport is under the Department of Public Works of Massachusetts with design and construction handled by the Division of Waterways under R. K. Hale, director, and E. N. Hutchins, chief engineer. The Division of Waterways has asked the highway unit of the public works department, under R. W. Coburn, chief engineer, to design and supervise construction of the runways.





The East Boston airport is being extended in stages and will eventually include some 2,000 acres. Present filling is being done only in strips at the runways.

Included in plans for the airport is an express connection to the Sumner Vehicular Tunnel and to the McClellan Highway to the north giving high speed access to the port from the business area and suburbs to the northeast.

Airport expansion is voted by Los Angeles

A $12,500,000 municipal airport bond issue was approved by voters of Los Angeles, Calif., recently. The money will be added to $2,000,000 remaining from a 1941 airport bond issue to enlarge and improve existing terminal facilities southwest of the city.

Contract for grading, storm drains, sewers, and paving of hangar aprons and passenger loading facilities already has been let to Nathan A. Moore, San Marino, Calif., the amount being $485,564. Thickness of the concrete on the 3,900 x 180-ft. hangar will vary from 10 in. at the edges to 8 in. at the center, and will be laid on top of a 4-in. emulsified asphalt stabilized base.

The airport now has six runways ranging in length from 4,660 ft. to 5,390 ft. Expansion plans call for lengthening of two runways to 7,000 and 10,000 ft., respectively, and for the construction of five new runways. Of the new strips, one would be 10,000 ft. and four would be 7,000 ft.

Airport Engineer Thomas Tucker said that thickness of the new runways will vary in accordance with the types of subsoil encountered as determined by borings in the immediate future.

Immediately upon passage of the bond issue, City Attorney Ray L. Chesebro began preparation of an ordinance for the condemnation of 1,325 acres of land needed for expansion of the present 625-acre site.

An additional 420 acres will be acquired by the city from Los Angeles County, through the payment of taxes due on tax-delinquent land.

Because of delays incident to condemnation proceedings, it is anticipated a minimum of five years will elapse before all of the expansion work has been carried out.

Equipment distributors plan active part in veteran's reemployment

Spot sales of surplus equipment also discussed at board meeting in Chicago—Washington, D. C. staff to be increased

Disposal of surplus construction equipment, reemployment of returning veterans, and increased cooperation with equipment manufacturers and road building agencies were chief topics of discussion at a board meeting of the Associated Equipment Distributors held in Chicago on June 17-19. In reporting on these highlights of the session, H. O. Penn, president of the association, declared that, in general, the distributors have few criticisms to offer regarding the recent spot sales of surplus government-owned construction equipment by the Office of Surplus Property.

"We feel, however," said Mr. Penn, "that the description of this equipment as contained in advance notices of sales to be held, has been inadequate in many instances." Moreover, less confusion would ensue if the various governmental agencies holding such equipment would "screen" it more thoroughly to determine what should be offered for sale and what should be termed "junk" and disposed of as such, he said. Mr. Penn expressed the opinion that in most cases the bids offered at recent surplus equipment sales have been substantially higher than the industry can continue to pay, and reflect a profit.

Propose liaison with government

The association believes that a group of distributors and manufacturers should be selected to act in liaison with the governmental agencies to determine what equipment has re-sale value and what is obsolete. Such action would be one safeguard against wornout equipment getting into the hands of the unscrupulous speculator.

The association's Surplus Property Disposal Committee, headed by Wm. Danner of Boston, Mass., also proposed that government-owned construction equipment, particularly that which may be declared "surplus" while still new or nearly new, should be liquidated in an orderly manner extending over a five-year period. The committee plans to meet the equipment manufacturers soon to work out such a plan.

Plan veteran reemployment

Reemployment of the returning veteran was a topic of much serious discussion. Albert C. Garlinghouse of Los Angeles, chairman of the association's Committee on Reemployment of Returning Veterans recommended that each distributor make direct contact with, and sponsor the reemployment of, at least one returning service man. The committee plans to work through the association's 15 regional directors, and local A.E.D. groups to facilitate the reemployment of these veterans not only in the equipment distribution field but also in allied industries. Final plans have not been completed but they are in the process of being formulated.

Expand headquarters personnel

An expansion of the association's executive personnel is planned for the near future. One full-time member will be added to the Washington, D. C., staff whose chief duties will be to coordinate the activities of the distributors and the manufacturers, and to promote closer cooperation with road building and construction industries such as the Associated General Contractors of America and the American Road Builders Association.

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President wants highway to Alaska completed

President Truman, at a press conference June 21 in Olympia, Wash., advocated completion of the Alaskan Highway as an essential postwar project. He made the announcement after meeting with Gov. Ernest Gruening of Alaska and Sen. Warren G. Magnuson of Washington.

The President said that the commission which planned the original highway would be revitalized to plan the construction of the last 600-mile link of the highway between the United States and Alaska. This refers to the proposed link from our Pacific Northwest through British Columbia to connect with the Alcan Highway already built.

Two identical bills (H.R. 3547 and H.R. 3548) have been introduced in the House of Representatives authorizing the President to negotiate with the Canadian government to obtain the immediate survey and location of a highway to connect the road system of British Columbia in the vicinity of Prince George with the Alaska Highway in the vicinity of Whitehorse, Yukon Territory. The bills specify that the highway should follow the general line of the route designated Route "A" selected by the Alaska International Highway Commission pursuant to an act of Congress of May 31, 1938. The President is authorized to enter into an agreement under which the United States will share with the Canadian government, or with the government of British Columbia, the cost of the surveys and construction of the highway. The bills would authorize appropriation of a sum not to exceed $15,000,000.

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Appropriation for 1946 military construction

Construction money expected to be provided by Congress in the appropriations for the military and departmental activities of the War Department for the fiscal year 1946 includes $136,000,000 for work at military posts by the U. S. Army Engineers. This sum was included in the 22 billion dollar War Department budget President Truman placed before Congress two weeks ago and no major reasons are seen why that amount will not be approved. Also included in the budget as presented is $540,000,000 for the maintenance, repair and operation of Army barracks and quarters, utilities, airfields, and other military facilities. Some minor construction will be possible in using this money. In addition, Congress is expected to provide somewhat over 2.6 billion dollars for equipment, including a large amount of construction machinery to be shipped overseas.

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Lumber picture fails to improve, WPB reports

Continued decline in lumber production and in mill and concentration yard stocks was reported by the War Production Board early this week in a summary of April production. Lumber production in April was estimated at 2,462,356,000 b. ft., a decline of 8.3 percent from production in April, 1944, and 1.2 percent from that of March, 1945. In contrast, the normal seasonal production trend from March to April is an increase of about 5 percent, WPB pointed out. Lumber production from January through April, 1945, or for the first third of this year, was 10.4 percent less than for the same period last year. As a result of the continued heavy demands for the war program, very limited lumber supplies are seen available for construction in the next few months.

General Styer heads Pacific supply division

Gen. Douglas MacArthur announced in Manila last week the establishment of a new supply organization, known as U. S. Army Forces, Western Pacific, or AFWESPAC, to take over the SOS in his theater. All Army non-combat forces in the area, including Engineers, come under AFWESPAC. The commander of the new organization is Lt. Gen. Wilhelm D. Styer, until recently deputy to General Somervell in the Washington headquarters of the Army Service Forces. General Styer's chief of staff will be Maj. Gen. Edmond H. Leavey, who served as assistant chief of staff for logistics, Pacific Ocean Area, under Admiral Chester W. Nimitz.

General Styer

Both Styer and Leavey are Engineer officers. It is also understood that Brig. Gen. L. D. Worsham, recently assistant chief of engineers in charge of troops, has left Washington to join General Styer's staff. Chief engineer for General MacArthur is Maj. Gen. Hugh J. Casey, while all Engineer construction in the theater is handled under the direction of Maj. Gen. L. J. Sverdrup, chief, Construction Services.

General Leavey

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Engineer officers named for promotion

On June 18 President Truman sent to the Senate a list of promotions for Army officers including these engineers:

Brigadiers to be major generals: Ewart G. Plank and Stanley L. Scott.

Colonels to be brigadier generals: Vincent J. Esposito, Gordon E. Textor, and William W. Wanamaker

The President also designated Capt. William H. Godson, Jr., to become a commodore in the Navy.

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Control of road work relaxed by the WPB

Preliminary work on construction of public highways and streets may be undertaken without War Production Board authorization if no lumber or building materials other than pipe for culverts are permanently installed, the WPB has announced.

This exemption for grading, ditch-digging and similar operations is added to WPB Order L-41-E, the control of public highway and street construction by government agencies. The amendment to order L-41-E provides an exemption corresponding to the one established in the May 29 revision of Order L-41, which is the general control of other types of construction.

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Wisconsin wants gas tax moneys segregated

The Wisconsin state legislature has overridden Gov. Goodland's veto of a bill to segregate all highway funds for strictly highway purposes. It is said that the governor has consistently opposed the setting apart of funds derived from gasoline and license taxes for highway development and urged a continuance of the past policy of using part of the funds for other state projects.

J. Andre Fouilhoux dies, leading architect

J. Andre Fouilhoux, 65, the architect who designed the "Theme Center"—the trylon and perisphere at the New York World's Fair, and a leader in his profession in the United States, died June 20 as the result of a fall from the roof of a Brooklyn building he was inspecting.

Mr. Fouilhoux, born in Paris and educated in France, came to this country in 1903. He became an American citizen and during the first World War he was an artillery officer in the U. S. Army, serving in the 129th Field Artillery with President Truman.

He was one of the designers of Rockefeller Center, where his concern, Harrison, Fouilhoux & Abramovitz now has offices, the McGraw-Hill building, and a number of other prominent structures in New York, Chicago and elsewhere. Mr. Fouilhoux was president of the New York Building Congress. He was active in French American activities and had been decorated with the French Legion of Honor.

JOBS OF THE WEEK

POWER HOUSE, Port Washington, Wis.

Wisconsin Electric Power Co., Milwaukee, Wis., will construct by separate contracts power house. The estimated cost with equipment is $7,119,500. Milwaukee Bridge Co., Milwaukee, has the contract for structural steel and A. Marchese Co., Milwaukee, will excavate and grade the site. F. A. Luber, is the engineer for the owner.

IMPROVING CHANNEL, California.

Bressi-Bevanda Constructors, Inc., Los Angeles and Macco Construction Co., Clearwater, have been awarded a contract by the U. S. Engineers, Los Angeles, for the first section of Lytle Creek Channel, from Warm Creek to Foothill Blvd., San Bernardino County. The work includes a reinforced concrete channel, with 1,181,000 cu. yd. excavation, 624,000 cu. yd. fill and 140,000 cu. yd. concrete. The successful bid was $2,528,350.

RUNWAYS, TAXIWAYS, etc., Merced, Calif.

N. M. Ball Sons, Berkeley, Calif., has been awarded a contract by U. S. Engineers, Sacramento, Calif., for runways, taxiways, and aprons, night lighting and drainage system at Merced Army Air Field, at $1,047,795.

HOMES, Glenside, Pa.

County Home Improvement Co., care of contractor, will construct 180 single homes to cost about $1,080,000. City National Construction Co., Philadelphia, Pa., will erect.

CAR HOLDING FACILITIES, Port Chicago, Calif.

Frederickson & Watson Construction Co., Oakland, Calif., has been awarded a contract for additional car holding facilities and related operating facilities, Inland Storage Area, Naval Magazine, by Bureau of Yards & Docks, Navy Department, Washington, D. C., at $1,690,000.

POSTAL CONCENTRATION CENTER, Oakland, Calif.

MacDonald & Kahn, Inc., San Francisco, Calif., will build a postal concentration center No. 2, at Oakland Army Base, for U. S. Engineers, San Francisco, to cost $1,430,941.

Note—Additional bidding and contract news on many projects large and small, including the above items, appear in the Construction News section beginning on page 155.

OBITUARY

Maurice G. Huerstel, 61, a civil engineer who had been engaged in several important New York City construction projects, died June 23. He attended Columbia University and worked for several years for the city on many projects, including the rebuilding of the Queensboro Bridge, for which he served as assistant engineer. The rebuilding of the St. Regis Hotel was done under Mr. Huerstel's engineering supervision while he was connected with the Durham Realty Co.

Max Spillman, 64, a consulting engineer with the centrifugal pump division of the Worthington Pump and Machine Corp., died at Clifton, N. J., June 22. Mr. Spillman, who received his technical education at Zurich, Switzerland, was responsible for the development of the Rocky River pump storage project in Connecticut, and was also one of the designers of the Metropolitan Aqueduct in Los Angeles, which transports water across the State of California. Twenty-five years ago he laid out drydocks for the Navy at the Panama Canal. In recent years he had helped plan industrial and commercial power plants, waterworks and sewerage systems. Five years ago the National Association of Manufacturers awarded the Pioneer Medal to Mr. Spillman for "outstanding development work in the field of pumping engineering."

Col. Carl R. Jones, 41, Chief of the Training Branch, Plans and Training Division, OCE, died in Washington, D. C., on June 16. Colonel Jones had served in the Office of the Chief of Engineers for two years after being stationed at Fort Belvoir, Va., for four years. He was a graduate of West Point, class of 1929, and had covered assignments in many parts of the world.

Clarence Hickey, 56, Washington state highway director since January of this year, died June 20 at Olympia, Wash. Born in Colorado, he moved to Washington as a boy and became an engineer in 1913. His wide experience in engineering included right-of-way and construction surveys and waterworks construction, as well as private engineering practice and road department activities. He worked on water systems in Everett, Wash., and western Oregon and served six months as assistant city engineer of Bremerton, Wash. Later he entered private practice in Everett and subsequently was made office engineer for the Snohomish County engineering department in 1925. He rose to county engineer, a position he held for 10 years until his appointment as state highway director. Hickey had been an active member of the Washington State Association of County Engineers, serving as secretary, vice-president and president of that organization at various times.

Joseph W. White, 67, retired engineer, died June 14 in Philadelphia, Pa. A veteran of the Spanish American War, he worked on the Panama Canal, and built roads and railroads in the Philippines. Since his retirement in 1938, he had lived in St. Petersburg, Fla.

Second Lieut. William E. Van. Winkle, formerly junior highway engineer for District 5, Illinois Division of Highways, was declared dead the early part of May. He had been missing in action over the Mediterranean since March 1, 1943.

John Nicholas Paulson, 71, engineer with the Hayward, Calif., City Water Department for 20 years, died June 14 in Hayward.

William R. Fogg, 68, of the Ballinger Co., Philadelphia, Pa., engineers, with which he had been associated for more than 40 years, died June 15 at Lansdowne, Pa.

Col. Frederick William LaForge, 81, New London, Conn., formerly city engineer, died June 15. Colonel LaForge was a civil engineer and for many years he held a reserve commission in the U. S. Army Engineer Corps.

Samuel L. Ramey, Montana State Highway Commission project engineer, died June 10 in Missoula, Mont. Previously he had served as construction engineer with the Milwaukee road and as county surveyor of Fergus County, Mont.

Lieut. Comdr. David Lindsay, (CEC) USNR, 41, former Houston, Tex., civil engineer and district representative for Shand & Jurs Co. at Houston, was drowned May 27 in the Philippines while serving with the Bureau of Yards and Docks of the Navy. He was a graduate of Purdue University.

James Jeffrey Roddick, 83, retired Winston-Salem, N. C., building contractor and a native of Scotland, died July 14. He formerly was connected with the construction firms of Miller Brothers and Fogle Brothers Co. at Winston-Salem.

TVA plans postwar move to Muscle Shoals area

The Tennessee Valley Authority plans to construct new headquarters buildings at Muscle Shoals, Ala., as soon as labor and materials are available, and it will move its general management staff, including the chief engineer, to that area as required in the original TVA Act of 1933. Alabama and western Tennessee interests have attempted to force this move for some time and in 1940 TVA requested money for new structures but the request was denied due to war conditions.

Announcement of the projected move was made by release of a letter from TVA to Representative Sparkman of Alabama in which it was stated, "As soon as conditions permit—progress of the war and release of manpower—we plan to request an appropriation of funds for office buildings and other facilities at Muscle Shoals so that the office of the board and the general management office and staff may be located there."

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Syracuse flood control outlined by Army

Plans of the federal government to protect Syracuse, N. Y., by flood control involving Onondaga Creek, were recently announced by Maj. W. D. Brunig of the Army's Syracuse District Engineer's office. While details have not been fully worked out, it is disclosed that the project will consist of a retention reservoir in combination with channel improvement. Planned for erection south of the city, the reservoir will have a capacity of 6 in. of rainfall over its tributary watershed, and will also have a fixed outlet to regulate runoff and reduce danger of overflow through the city.

Realignment of the creek channel between Dorwin and Atlantic Avenues, through an earth channel supplemented by levees where necessary, is another feature of the project. The new channel will have the same capacity as the portion through the main part of the city, improved some time ago. Cost of increasing the channel capacity is thought to be prohibitive, thus dictating the combination of retention dam and channel improvement.

New highway bridges on Dorwin Avenue and West Seneca Turnpike, called for by the plan, will be supplied by local interests according to Major Brunig. The city is also to provide lands, rights-of-way and utility relocations for both the reservoir and channel units of the project.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

The Normandy Beach Harbors

Sir: There seems to be quite a widespread acceptance of credit for the Normandy beach harbors. The Seattle, Wash., papers attribute origin of this construction to the Lake Washington Pontoon Bridge and its engineers; *Engineering News-Record* (Oct. 26, 1944, p. 3) states that these harbors were of British conception and construction. And, the *Christian Science Monitor* (Nov. 14, 1944, p. 6) carried an Associated Press story from Vicksburg, Miss., which stated that research by waterway technicians there, preliminary to this same construction, was of such a nature as to be so utterly secret and militarily confidential that their reports, transmitted immediately to the authorities in Washington, were never put in writing. If that doesn't impress the reader, what will?

The writer happens to have a booklet, titled *Reinforced Concrete Cribs* published in 1930 by J. H. Tromanhauser of Toronto, Canada. It shows views of reinforced concrete cribs constructed at Port Colborne, Ontario; Port Maitland, Ontario; and Montreal, Quebec.

The text states that such cribs have been "towed 25 miles in less than 5 hours and within 2 hours after arrival have been sunk in position." In that most excellent work *Concrete Structures in Marine Work* by R. Stroyer concrete crib breakwaters at Barcelona, Spain; Musel, France; Gdynia, Poland; Tuapse, Russia; Genoa, Spain; Kobe, Japan; Valparaiso, Chile; and elsewhere are referred to and shown in section or in illustration.

With quiet water provided by the breakwaters, so that ocean-going ships (which for years have discharged cargo onto lighters) could unload onto barge shaped, spud-anchored platforms, appears not inconsistent. Neither does the transfer of cargo thence to shore over pontoon bridges of ancient military type amaze. So it would seem that to some present man or group of men—whoever they may be—full credit and admiration should be given for recognizing a damn good idea when it occurred to or was proposed to them. And there is also, of course, the credit for its execution. Original credit, however, apparently antedates the present decade by—well, quite some time.

HOMER M. HADLEY
Regional Structural Engineer
Portland Cement Assn.,
Seattle 1, Wash.

South American Articles Liked

Sir: May I compliment you on the publication of the article entitled "Building Codes Explain the Slenderness of South American Structures," by A. J. Boase, published in *Engineering News-Record* of April 19, 1945.

This is the type of article for which I think there is a great need in American engineering literature. Too often, I believe, our articles concern themselves either with a description of the construction methods used or the technical analysis of a particular kind of structure. This article, on the other hand, gives a broad view of general practice and calls attention to foreign developments in engineering lines. I think that we American engineers can well take notes of foreign practice, which, operating under different conditions, gives rise to a varied development from fundamental physical principles.

At the same time I am reminded also to compliment you on the article "Wind Failures of Suspension Bridges," by J. K. Finch, Renwick Professor of Civil Engineering, Columbia University, *ENR* March 13, 1941, vol. p. 402, giving the historical record of suspension bridge failures. It is possible that if this information had been current knowledge at the time of the design of certain suspension bridges that certain subsequent expense in connection therewith might have been avoided.

I suggest the desirability of more articles of these types.

ARTHUR J. BULGER
New York, N. Y.

Brazilian Building Codes

Sir: I should like to answer two questions raised in Mr. Boase's very interesting article in *ENR* April 19, 1945.

On p. 73 he finds it difficult to understand that the modular ratio n is given as 15 for stress calculations and as 10 for calculations that have to do with deflection and moment. This provision, as well as many others mentioned by Mr. Boase, is derived from the German Code 1932. Its reason is quite intelligible: Stress calculations are related to one section, usually subjected to high stresses, whereas calculations that have to do with deflection and moment include the whole structure. In the first case a modulus of elasticity of concrete of 2,000,000 psi. can be assumed locally, in the second case, the concrete stresses are small in the best part of the structure and an average of 3,000,000 psi. is a nearer assumption.

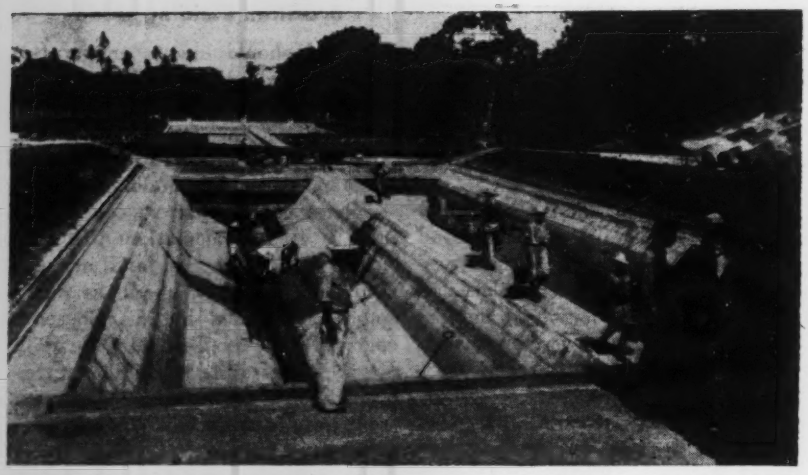
What Mr. Boase calls "continuous beam method" for flat slabs also originated in Germany. Its author is Dr. Marcus, now in the United States who published it in *Beton und Eisen* 1926, Nos. 19, 20, under the title: "Die wirksame Stutzflache der tragerlosen Pilzdecken."

K. HAJNAL-KONYI
Consulting Engineer
London, England

El Salvador Sewage Plant Operation

Sir: Operation of the unusual, low-cost San Miguel, El Salvador, sewage treatment plant described in *Engineering News-Record*, Oct. 7, 1943, vol. p. 528, is proving so satisfactory that the results are outlined with the hope that this information will aid other organizations now at work on sanitation problems in Latin American areas.

The plant, which is illustrated by an accompanying photograph, was built with local materials at a contruction cost of $6,000. Designed to treat the sewage from a population of about 17,000, the plant consists of shallow settling tanks followed by a modified trickling filter. No digestion is provided, raw sludge being discharged to drying beds of the following four types: (1) a solid pavement of hollow clay tile; (2) open-joint under drains



Built of local materials at a construction cost of $6,000, San Miguel sewage treatment plant is proving efficient and easy to operate. Flow of sludge from settling basin (foreground) is manually controlled by means of timbers at bottom of tank. Drying beds and filters may be seen in distance.

covered with sand; (3) sand without under-drains; and (4) local porous earth without underdrains.

When first placed in operation in April 1943, sludge was drawn frequently but the constant supervision required to secure proper operation could not be provided. More recently the tanks have been operated as modified septic tanks and sludge is drawn weekly.

A study of plant operation was made on March 28, 1944. A composite sample of the sewage was taken at the three points shown in Table 1 and analyzed for 5-day 20 deg. C. B.O.D., settleable solids and suspended solids.

When the analysis shown in Table I was made the plant was being operated by one man assisted by a laborer to remove dried sludge from the beds. On this date wastes from an alcohol plant were discharging into the sewers, resulting in a B.O.D. load of almost twice the normal domestic value. Also, one-half of the trickling filter area had been converted into a Dunbar bed for experimental purposes.

Performance of the plant at that time was considered very satisfactory. There were few odors, flies were not numerous, and the effluent had no noticeable effect on the receiving stream.

In October 1944 another composite sample was taken showing the following overall removals:

Settleable solids	93	percent
Suspended solids	89	"
5-day, 20-deg. C. B.O.D.	76	"

These results also indicate effective operation. However, since at present the plant is practically self-operating, it is believed that better results could be obtained with competent operation. Moreover, the filters were designed for 25 persons per cubic meter of stone, which is too high, as more satisfactory results are obtainable with a load considerably under the design capacity. As a result, when the connected population is increased more filters will be necessary.

This report is based largely on data obtained by Capt. Paul C. Ward and Capt. E. L. Dudley, both of the Sanitary Corps, U. S. Army.

LT. COL. HENRY W. VAN HOVENBERG,
Sanitary Corps, U. S. Army,
Chief of the Institute of Inter-American Affairs Field Party in El Salvador

TABLE I—OPERATING CHARACTERISTICS SAN MIGUEL, EL SALVADOR, SEWAGE TREATMENT PLANT

Sampling Point	B.O.D.		Settleable Solids		Suspended Solids	
	ppm.	% removal	ppm.	% removal	ppm.	% removal
Influent	470	—	5.0	—	316	—
Settling Tank Effluent	267	43	0.6	88	98	69
Final Effluent	138	70	0.4	92	40	87

Note: Data above was obtained with following flow conditions: Mean flow—630,000 gal. per day; mean detention period—5.25 hr.; filter dosage—10.1 million gal. per acre per day; and filter loading —3,730 lb. of 5-day, 20-deg. C. B. O. D. per acre-foot.

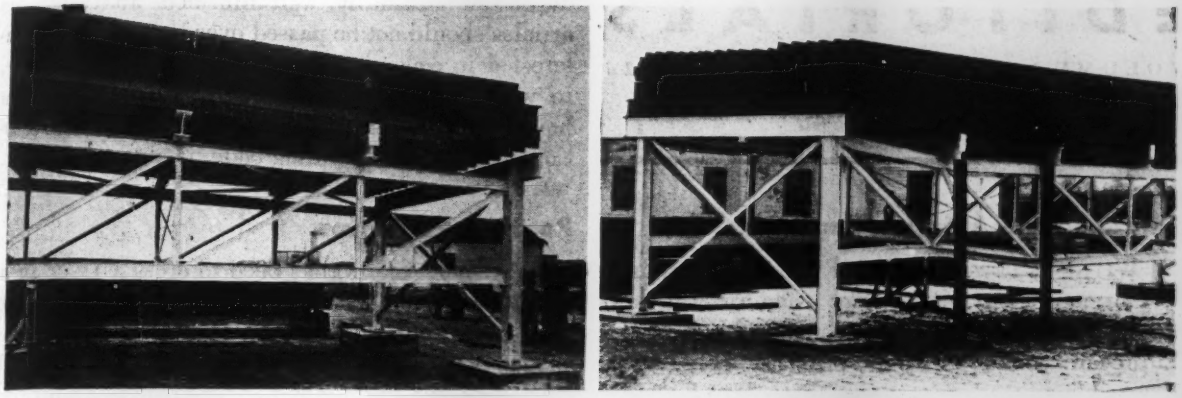
H-Sections for Trusses

Sir: I read the article, "H-Sections Form Standard Length Trusses," (*ENR* Jan. 25, 1944, vol. p. 122) with interest, because H-sections arranged in this way offer the opportunity for making better welded trusses today than were ever possible in riveted construction with other conventional shapes and angle members. All inaccessible surfaces are eliminated and the maintenance problems are greatly simplified in these new trusses. The wide flanged H-sections also supply the required stiffness perpendicular to the plane of the truss for use as diagonal compression members.

The article states "that failure occurred by buckling at the vertical web member on the left at a time when the superinposed load was 240,000-lb., equal to 253 percent of the design load." I wonder how much of this 240,000-lb. load was supported directly on the end posts and how much of it was actually supported on the inner panels of the welded trusses. From the photograph the first layer of loading beams appears to contain many full length beams that extend to the end panel points of the 50-ft. span. If this is true, then the twenty or more beams can carry the whole 240,000-lb. load with only a one inch deflection at the center of the 50-ft. span even if the trusses were not under them at all.

I was amazed at the statement of the designers that "here for the first time, H-sections are used throughout without gusset plates," because the construction of a truss without gusset plates is somewhat akin to building a beam without the web. If this truss as fabricated did carry these loads without gussets, it was only because the webs of the I-beam chords were sufficiently strong to act as gussets in transferring the shear from the diagonals to the verticals in addition to their other normal chord stresses, without failure. It also means that the maximum amount of web metal required at the ends of the span has been used throughout the full length of both chords of the truss, in the webs of the chords themselves, since the maximum shearing stresses occur only in the end panels and end web members of the truss.

I also wish to call attention to the weakness of the diagonal and vertical web member connections to the



The fact that the beams used in loading welded truss did not rest on the end purlins can be seen in the picture on the left. Failure was due to buckling of the end vertical as shown on the right. Supports were placed under the extended purlins after the test was completed to prevent the superimposed load beams from falling off.

I-beam chords of these new trusses for the sake of welding in the future. The web metal of the posts and diagonal members, where it connects opposite to the web of the chord, is the only metal that has any backing by means of which it can resist the stresses. The outstanding flanges of the web members connect to the outstanding wide flanges of the chords and the pull or bearing exerts itself against nothing except the flexural stiffness of the flange. The flanges of the chords have no backing opposite the flanges of the web members and there is no direct path provided for the stresses in the flange of the web member to be connected to the web plate of the chord while the chord is acting in place of the gusset. At maximum loads the flanges of the chords will bend and most of the stress will have to concentrate into the webs of the connected members, causing unduly high stresses in this part of the weld.

NED L. ASHTON
Department of Civil Engineering
State University of Iowa
Iowa City, Iowa

Sir: The principal point raised by Prof. Ashton can be cleared up instantly, as no part of the load rested on the end purlins which were supported by the end posts. We regret that this is not evident from the particular photograph used for the illustration. Unfortunately, conditions for photography were far from ideal as the test was carried out on a very gloomy day in January, a year ago, with a light snow falling.

There were several inches clearance between the end post purlins and the load beams. This is shown by a number of close-ups which we took. This detail was purposely so designed to "catch" the load when the truss failed, as the test was witnessed by over one hundred engineers from coast to coast, and we did not want to have 120 tons of loose steel bouncing around near them. The end post purlin was specially designed to resist the impact of this load.

Trusses without gusset plates are not new. We have been using them for at least seven years in welded trusses made up of T-sections from split I's and H's.

As a matter of fact, the early studies of the H-section truss did include a form of gusset, but our analyses showed that they were not needed for our normal roof loads on spans up to 80 ft., so we omitted them.

The transfer of stresses at a joint in this truss is different from that in the average truss with a gusset, but may be analyzed by common, accepted methods. However, because it was unusual, we gave this a great deal of study; our research division working on it for the greater part of a year.

During the tests all joints were observed closely, but their performance was perfect. The failure came suddenly and as a complete surprise, since there had been no signs of developing weakness. As noted in the article, failure occurred from buckling of the end vertical, as a column. It bowed out about 18 or 24 in., whereupon the end post purlins picked up the load and further buckling ceased.

Our studies and records on this research are voluminous, but you can check our results independently, as all requirements of the American Institute of Steel Construction and American Welding Society Codes are satisfied.

You may be further interested to know that 125 trusses of this type, for spans of 50 and 60 ft., have been installed since this development was released. They are extremely stiff and handle well during erection. In fact, an unexpected compliment on these trusses came from the iron-workers. They particularly liked them because of the double-flanged top chord which enables them to stand or squat with their feet on the bottom flange, pinching the top flange between their legs or knees.

J. K. GANNETT
Vice-president and Director
of Engineering and Research
The Austin Co., Cleveland, Ohio

Emptying Oil Drums

Sir: In the May 31st issue of *Engineering News-Record*, p. 96, a method for emptying fuel oil drums with compressed air was described.

The article warns of the precaution which should be taken to control the air pressure, but we believe this is an unsafe method since in most cases the connection would be made from a source of air supply which would be beyond the capacity of the drum and this can easily lead to an explosion of the drum and a serious accident. We speak from experience.

We are writing to let you know of our experience because it may benefit others who would learn too late.

C. W. HINES
Manager of Erection
Chicago Bridge and Iron Co.

EDITORIALS

VOLUME 134 NUMBER 26

June 28, 1945

Salute to the Aviation Engineers

WITHIN A FEW HOURS after the Allied landings on Normandy, our planes were using airstrips laid down by Aviation Engineers, and throughout the European campaign this specialist corps constructed many advance bases that played a vital part in final victory. At the same time, these fighting engineers were engaged in building strategic facilities on Pacific islands from which B-29 Superfortresses are now bombing the Japanese homeland. Organized in June, 1940, as an integral part of the Air Forces, and with its officers wearing the castles of the Army Engineers, the Aviation Engineers may well take pride in their accomplishments. They have not only built rapidly and well, but have made new contributions to construction techniques, notably in methods of surfacing advance fighter airfields. To the Aviation Engineers, who have both built and fought in Africa, Europe, and the Pacific theaters, congratulations on this fifth birthday.

Foreign Trade in Design

IN THESE DAYS of hopes and plans for improved mutual understanding and cooperation among nations of the world, the articles on concrete building design practices in Brazil that Arthur J. Boase is writing for this journal have unusual importance. In the first instance, they afford American engineers an unequalled opportunity to study and comprehend the design practices of a foreign country. But more importantly, since these practices are different from ours, bolder in some respects, more conservative in others, the articles act as a stimulant to a revaluation of our own procedures. Whether or not such a revaluation results in any changes in American practices or codes, a useful exchange of technical information will have taken place. This is foreign trade just as much as is an exchange of rail steel for coffee. What we get out of a study of Brazilian methods is an import, and our reasons for rejecting some practices are an export that our friends in South America can use to revaluate their methods. As nations are drawn closer together by travel and communications, more of this kind of foreign trade should be possible. And since Mr. Boase has produced an unusually well-informed analysis, his articles should not be passed over by any reader interested in concrete design. The one in this issue, in which an actual 16-story Brazilian apartment house is redesigned according to the American Concrete Institute building code, is a case in point.

Pontoon vs Ponton

WHEN ARMY ENGINEERS need to cross a river in a hurry they use "pontons" to support the bridge they build, but when the Seabees build a floating bridge or pier they support it on "pontoons". And the respective services are quite sensitive about the way the word is spelled; each regards the use of the spelling favored by the other as a slight affront. All of which led us to state about a year ago (*ENR* April 20, 1944, vol. p. 538) that we would call the float a "ponton" when the Army built it and a "pontoon" when the Navy built it. Our readers outside the military services, we thought, would not be too confused by this dual terminology, as the two spellings seldom would appear in the same issue. Unfortunately, we did not know of General Eisenhower's plans for crossing the Rhine. When we learned that he had sent Navy "pontoons" to the Army Engineers to use in building their bridges we found ourselves in a complete dither. Did a Navy "pontoon" become a "ponton" when the Army Engineers laid their hands on it? Would the sensitive feelings of both services be hurt if we used the wrong spelling at the right time in such a confused situation? And what would the uninitiated reader think when we spelled the word one way in one sentence and differently in the next? To break the impasse, although fully aware that Army tradition might dictate otherwise, we came to the conclusion that an English-language journal should use the English rather than French spelling. That is the explanation of why—regardless of who builds or uses them—all floats are "pontoons" to us and all bridges "pontoon" bridges.

Engineers for Public Works

MUNICIPAL, COUNTY AND STATE government engineers are generally among the lowest paid of professional groups, a condition currently brought to attention by the inability of these agencies to attract technically trained personnel. Better prospect for remuneration in such work is a prime requisite if men of the caliber needed for efficient public service are to be secured. Less tangible, but of great importance, is the establishment of career service opportunities through adequate pro-

vision for advancement and tenure. The latter, in some respects, may compensate for the higher, immediate financial return offered in private enterprise ventures of lesser stability. Under existing conditions it seems essential that some inducements over current salary be offered if the men needed for local government are to be secured in competition with private industry.

The Future Supply of Engineers

A DEPRESSING PICTURE is painted in the report on professional training during the war period that was made public recently by the American Council on Education and the National Research Council (*ENR* June 21, vol. p. 259). The authors see progress in this country permanently retarded from a lack of physicians, engineers, chemists and physicists resulting from failure of the Selective Service to defer thousands of young men so that they could continue their studies in those fields.

Statistically, the joint A.C.E.-N.R.C. report may be accurate, although it appears to be colored by unwarranted pessimism. But if its conclusions are correct, then this country indeed is in a bad way! Not for lack of potential scientists and professional men, but for lack of the vision, spirit and initiative that in the past contributed so much to the present greatness of this country.

Unfortunately, the writers of this report have listed all the liabilities of the present situation and none of its assets. They give almost no recognition to the training that is being given to men in the armed forces. Since the war began, over 25,000 men have been trained or now are being trained under the Navy College Training Program or the Army Specialist Training Program. Much of this training has been done in our engineering schools and has extended over many months. Other hundreds of men have received special types of engineer training in army camps and officer-training schools. True, much of this latter training has been of limited scope, but it certainly should shorten the postwar training period for the men who took it.

Not to be overlooked, either, is the fact that the men who took the Army and Navy college training were selected on the basis of demonstrated mental ability and not on the basis of their financial resources. In large measure they represent the scholastic cream of the drafted men, and thus should include a high percentage of those who under other circumstances would have become the outstanding engineers and scientists of their age group. Hence, the sharp decline in students in our engineering schools may not be nearly as serious as it appears when measured by numbers alone.

Authors of the joint report completely overlook the fact that under the G.I. Bill of Rights every young man now in military service will be given an opportunity to continue his education at federal expense after the war. That plan will open the doors of higher education to thousands who would not have received that opportunity in normal times. These men will approach their postwar training with a maturity and seriousness that should do much to offset the lost time. Further, if necessary, these men can be given the same kind of intensive training that our engineering schools developed with such outstanding success when American industry found itself in need of an unprecedented number of technicians in the early days of the war. Many of the returning men will seek such fast training in order that they may be free to set up their own homes at the earliest possible date.

In pointing to these more favorable aspects of the situation with respect to the future of engineering, we do not intend to indicate a belief that the adopted system has not had a serious effect on our educational system. It has. But the effect should not be permanent nor should it reach out over the next two decades, as the authors of the report hold. The disorganization and dispersal of the teaching staffs of our engineering schools appears to be more serious than the delay in training young men. Fundamental research also has been retarded, but that already has been offset in large measure by acceleration of research in fields that aid the war effort.

Refusal of the Selective Service to defer hundreds, probably thousands, of students on the theory that a steady flow of men into the fields of engineering, medicine and science is necessary was a wholly democratic decision. No boy could be kept out of the war by his wish or that of his parent that he take up study in one of these fields. Certain risks were involved if the war lasted too long, but we believe that the effect of this system upon the morale of the young men who are to be our future engineers, physicians and scientists will far offset any temporary disadvantages.

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AN ENGINEERING NEWS-RECORD FOREIGN REPORT

Albert Canal Repaired for War Traffic

Waldo G. Bowman
Editor, Engineering News-Record
(From the European Theater of Operations)

***Contents in Brief**—German efforts to deny us the use of Belgium's great Albert Canal as a route for war supplies from Antwerp to the front were overcome by U. S. Engineers in removing or replacing twenty-one wrecked bridges dropped across the channel, in raising sunken barges and in repairing damaged locks. Tractor winches and expert rigging played vital parts in the success of the work, which was done in the middle of the winter.*

FARMERS AND TOWNSFOLK along Belgium's Albert Canal were treated to an unprecedented sight on Dec. 15 last when a barge flying the American flag moved up this great waterway that connects the port of Antwerp with Liege on the Meuse River, 80 miles inland near the German border. Yet it was not the foreign flag, but the fact that the canal could again float barges that made the scene remarkable. Not since the Germans had left, after damaging the canal locks and blocking the channel with wrecked bridges and sunken barges, had the canal carried traffic. Now it was back in service. And before many weeks, these same Belgians were to see barge after barge of military freight pass and, finally, even the U. S. Navy's LCM boats that were to be used in our crossing of the Rhine.

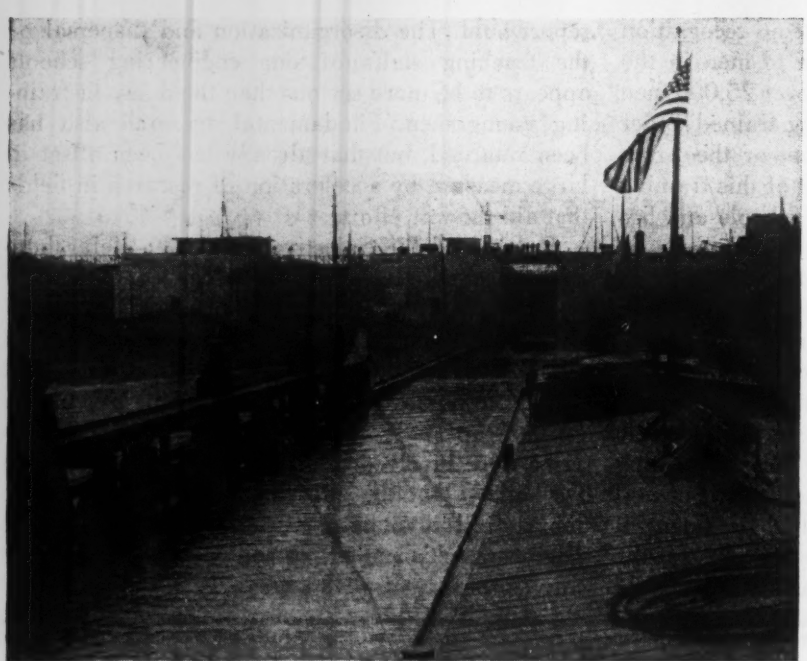


Fig. 1. A barge flying the American flag approaches the small chamber of the Genck lock, signalizing the reopening of the Albert Canal by U. S. Engineers.

From a series of useless pools formed by masses of German-made wreckage, the Albert Canal became a war traffic artery of the first order. How it got that way was the result of a tremendous effort on the part of U. S. Engineer troops of the Advance Section, Communications Zone organization belonging mostly to the 1056th Port Construction and Repair Group. Briefly, the "effort" involved the removal of 21 heavy rail and road bridges and of four earth dams, the lifting of some 50 sunken barges and other obstacles and the repair of four sets of locks. It is with brief accounts of some of the procedures used that this article is concerned.

Canal is large and modern

The Albert Canal, completed in 1939 after ten years of work by a labor force that several times reached a total of 12,000 men, is one of Belgium's proud national assets. A product of one of the famous construction operations of modern times—involving the movement of 82 million cubic yards of earth, the use of 10 million barrels of cement and the erection of 64 major bridges—its huge cost has been held justified on the grounds that it gives Belgium a cross country waterway wholly contained in its own territory; that it connects the great port of Antwerp with the busy inland waterway sys-

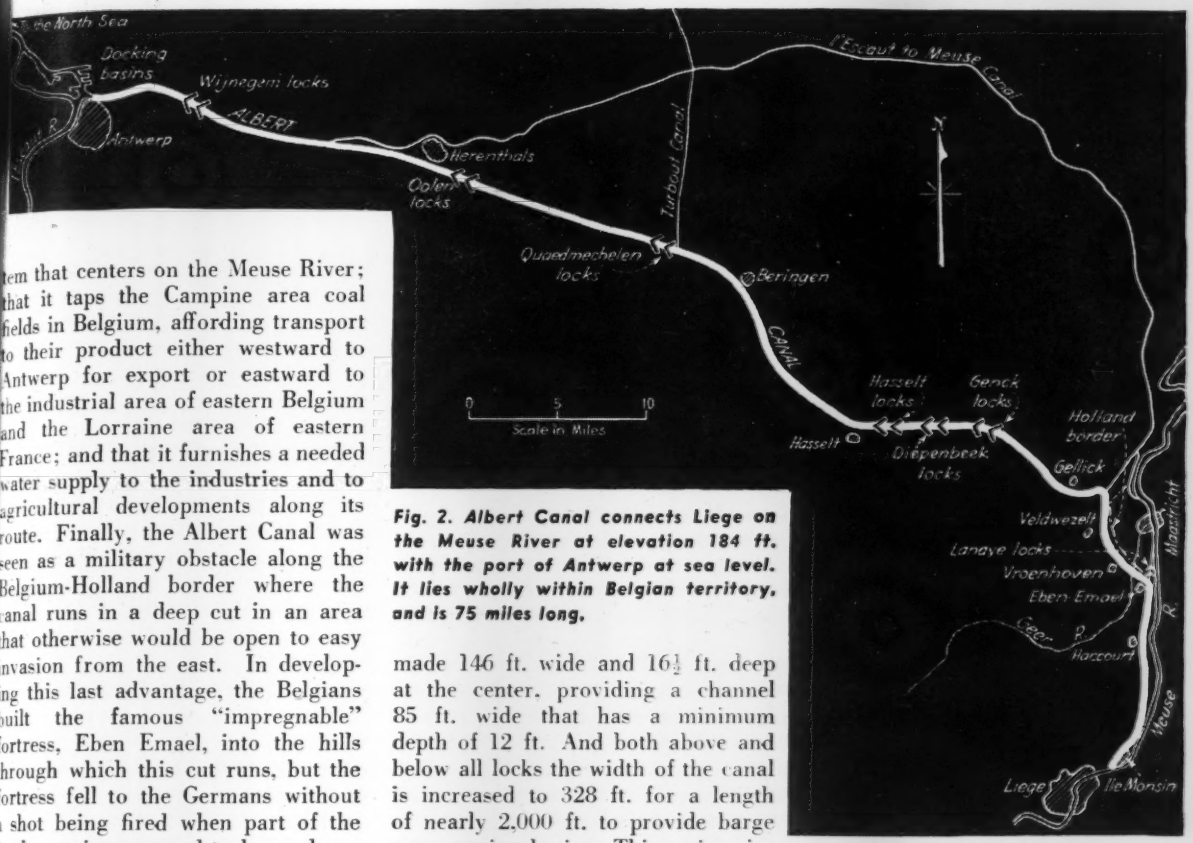


Fig. 2. Albert Canal connects Liege on the Meuse River at elevation 184 ft. with the port of Antwerp at sea level. It lies wholly within Belgian territory, and is 75 miles long.

tem that centers on the Meuse River; that it taps the Campine area coal fields in Belgium, affording transport to their product either westward to Antwerp for export or eastward to the industrial area of eastern Belgium and the Lorraine area of eastern France; and that it furnishes a needed water supply to the industries and to agricultural developments along its route. Finally, the Albert Canal was seen as a military obstacle along the Belgium-Holland border where the canal runs in a deep cut in an area that otherwise would be open to easy invasion from the east. In developing this last advantage, the Belgians built the famous "impregnable" fortress, Eben Emael, into the hills through which this cut runs, but the fortress fell to the Germans without a shot being fired when part of the fort's garrison proved to be made up of German officers and soldiers in disguise.

In order that the canal be of ample size for modern water traffic, the designers based its cross section and locks on the use of 2,000-ton barges, 328 ft. long, 40-ft. beam and 10-ft. draft, and on 600-ton barges with the same draft but 164 ft. long and 22-ft. beam. Each lock was provided with three chambers (Fig. 3), two for the large barges, 52.5 ft. wide and 446 ft. long and one for the 600-tonners, 24.6 ft. wide and 180 ft. long. The water cross section in the canal was made 146 ft. wide and 16½ ft. deep at the center, providing a channel 85 ft. wide that has a minimum depth of 12 ft. And both above and below all locks the width of the canal is increased to 328 ft. for a length of nearly 2,000 ft. to provide barge maneuvering basins. This major size stream is not only carried in a trench across flat farmland, but it traverses cuts as much as 300 ft. deep and for some distance in the industrial Meuse valley is confined between concrete walls above the level of the surrounding country.

Route of the canal

As shown on the map (Fig. 2), the canal begins at Liege at the Ile Monsin where it branches off from the Meuse. It parallels this river running due north for about 10 miles to Eben Emael where it turns northwest to cut through the 300-ft. high hills that border the valley of the Meuse and separate it from the Geer River valley. About 10 miles farther north the canal turns west, and then follows a northwesterly direction on the 60-mile stretch to Antwerp, most of which is through flat country.

The first lock occurs at Genck, 25 miles from Liege, so that a long single, level pool is available through the industrial area that the eastern end of the canal traverses. The Genck lock drops the canal 33 ft. from its 184-ft. elevation at the Meuse, after

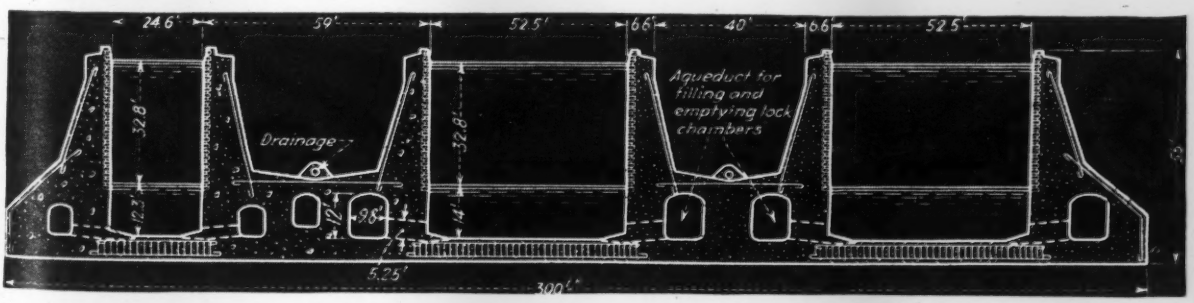


Fig. 3. Typical lock cross section, showing the two chambers for 2,000-ton and the one for 600-ton barges. Nate the tunnels through which water enters and leaves the chambers. It was in these tunnels that charges were set off to damage the lock at Quaedmechelen.

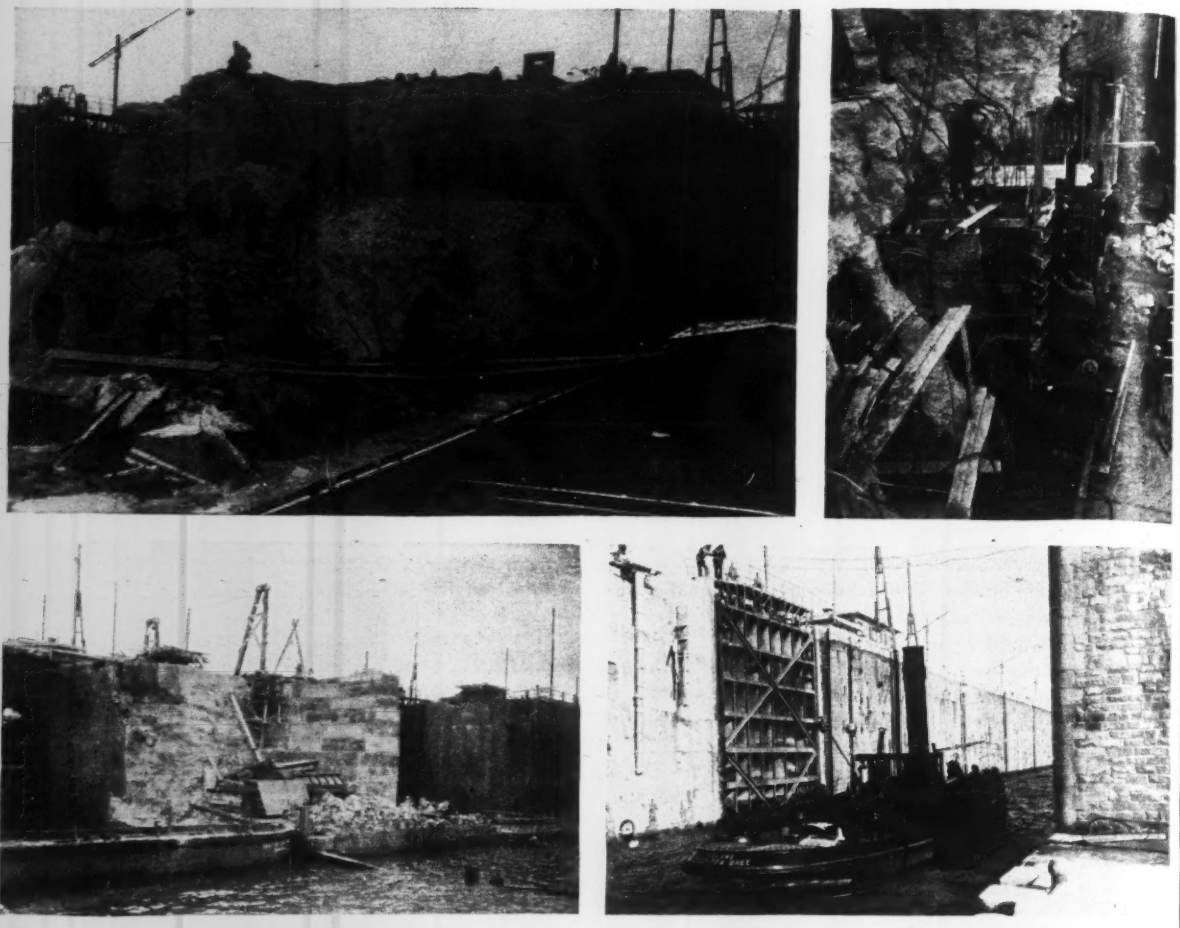


Fig. 4. Four stages in the repair of the Quaedmechelen lock. Top, left, removing debris onto a barge pulled up into the lock entrance. Top, right, building forms for a new lock wall and gate support in the entrance to the chamber rendered dry by a stop log (lower left view) in the form of barges that are floated into place. In this latter view the new wall is complete, and in the right bottom view the gate leaf has been rehung and the lock put back in service.

which four other 33-ft. and one 19-ft. lock complete the lowering to sea level at Antwerp.

In addition to the waterway proper the Albert Canal enterprise included siphons to carry streams beneath it and a large number of bridges to carry railroads and highways over it. American engineers will recall the wide use of Vierendeel type trusses (that is, those having panels with rigid corner joints and no diagonals) for the Albert Canal bridges; in general, these structures were of three spans, a center one of 192 ft. over the canal with shorter girder spans over the haulage paths along the banks. In the deep cuts and in the cities several special types of bridges were built, some in concrete, some in steel.

It was this major facility that the Germans sought to wreck, both to deny its use to us as a waterway and to make it an obstacle to the easy movement of our armies. Although they seem to have missed or passed over several good opportunities for causing damage, such as blowing of the lock gates or shattering of the concrete canal walls where they are above ground, a reasonably thorough job of demolition resulted. Bridges took the brunt of the damage, which was fortunate because we were well equipped to clear the type of wreckage that resulted or to repair it when possible. Lock damage was mostly confined to the electrical machinery except for one installation where demolition charges blew out a section of wall and unseated one of the gates.

In the interest of getting the canal into service quickly after we captured Antwerp and determined to make it our principal supply port, the waterway was divided into two sections of about 40 miles each—from Antwerp to Quaedmechelen went to the British, and from Quaedemechelen, including the locks there, to Liege was the American section. Except for one badly wrecked concrete bridge in Antwerp, the British had a fairly easy repair job to handle. In the American section, however, were four of the five high-lift locks and the deep cuts of the canal where bridge repair was particularly difficult. Reopening the canal was scheduled in two phases —first to render it capable of passing 600-ton barges by Dec. 15, and then to complete full repairs so as to accommodate the 2,000-ton barges by Feb. 1.

The principal lock repair job occurred at Quaedmechelen where charges placed in the water-supply

and-emptying-tunnels between the two large chambers (Fig. 3) blew out the west or downstream end of the lock masonry (Fig. 4), taking with it the support for the hinges of one of the gates. A new wall was required, and the tunnel had to be cleared and rebuilt.

Pick and shovel work

Engineer troops, supplemented by Belgian laborers, as was the procedure on all of the Albert Canal work, tackled the job with pick and shovel since quarters were too cramped for mechanical equipment. After the debris had been cleared and dumped into a barge moored alongside, the lock entrances were cofferdammed by special "plug boats," which were stop logs that could be floated into place. These were a part of the standard equipment of the canal's maintenance forces, and permitted the work of building a new concrete wall to go forward in the dry. Forms were built and concrete was mixed on top of the lock and chuted into place. Hinge seats for the gate were built in, and, as soon as the concrete had cured, a derrick hung the leaf, and the locks were in service again.

At the other locks—Genck, Diepenbeek and Hasselt—there were no demolitions, but all of the electrical controls had to be rewired, and parts of the control mechanisms repaired or replaced. At Genck and Hasselt there were also required jobs of cutoff-wall construction at the western or downstream end of the locks. For some reason such walls had not been a part of the original construction, and now that the canal had been emptied of water (by cofferdamming and pumping out to aid in the bridge cleanup and repair), its refilling was regarded as a threat to undermining the locks. The cutoffs consisted of steel sheetpiling driven to 28-ft. penetration and capped with concrete keyed to the lock walls and to the sills.

Bridge cleanup and replacement

Most of the obstacles in the canal consisted of bridge wreckage (21 bridges including 5 railroad bridges were destroyed in the American section) and it was the removal of this that occupied a good many squads of troops and their truck-crane and bulldozer equipment. Divers were required in a good many instances although, as stated, some sections of the canal were dewatered with the use of cofferdams, permitting work to be done in the dry. On the underwater operations it was found, after some experience, that it was better to remove large, complete sections of bridges with carefully installed rigging and extra equipment than to blast them into smaller, lighter pieces. Invariably, the time consumed was greater with the latter procedure and, from the Belgian point of view, it also damaged the steel beyond the possibility of reuse. Several spans were raised by jacking and cribbing, and in one case two spans were lifted back to their supports by a floating crane. Replacement bridges were usually of steel girder type on framed timber crib piers.

The most difficult and spectacular of these bridge jobs involved the raising of the 209-ft. span deck-type cantilever truss over the deep cut at Veldwezelt on the Holland border. This bridge, which with its two anchor arm spans was 373 ft. long, was dropped by being cut just west of the east pier, which also was demolished. The steelwork came to rest in the canal in the position shown in Fig. 6, where the eastern end of the bridge has been pulled away. The decision was to raise this remaining part of the structure, a length of about 164 ft., onto a new temporary pier and then to extend it to the other bank by two plate girder spans.

The work was done in two stages —first, a 22-ft. raise on timber cribbing completed by Dec. 15 so that 600-ton barges could pass beneath, and then a further raise to full height of 55 ft. so that the end of the span could be set on a steel framed pier resting on a concrete footing in the canal. This footing and the cribbing were placed in the dry while the canal was unwatered.

Skillful rigging required

The success of the Veldwezelt work rested on careful and skillful rigging, devised and installed by Capt. P. A. Cawley, a former American Bridge Co. man. In the first phase of the work—the raise to 22 ft.—a combination of lifting and jacking was used, four 100-ton screw jacks being operated at the corners of the crib and supplemented by hoist lines running over four derrick masts set up on either side of the down-end of the bridge. Two steam hoists and two tractor winches on top of the bank supplied the lift power. Aid to the lifting was supplied by removing six panels of concrete roadway at the outer end of the span (accounting for 180 tons of weight) and then piling 75 tons of counterweight on the rear end of the deck and another 15 tons on the bottom chord at the rear end panel point. Finally, a 50-ton downward pull was exerted at the back end

Fig. 5. Removal of a majority of the twenty-one wrecked bridges involved cutting off parts to reduce the weight, as is being done on this Vierendeel truss span near Quaedmechelen, and then pulling the remainder out with crawler tractors.

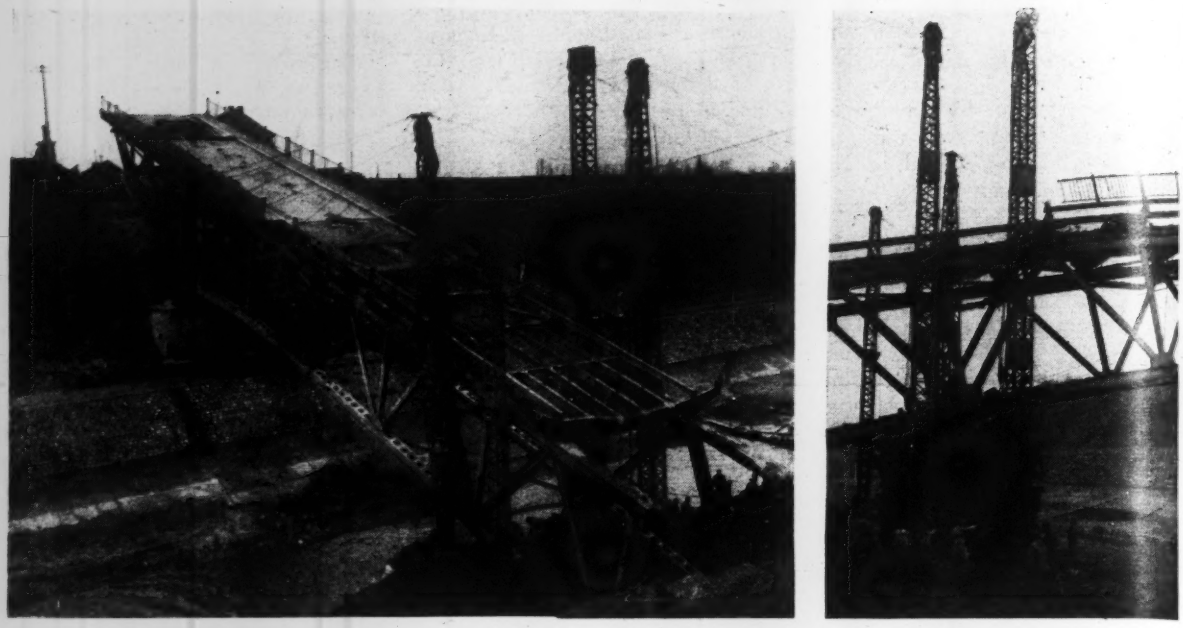


Fig. 6. Raising the cantilever truss span at Veldwezelt with the aid of jacks and of lifting lines running over the four masts to hoists on the bank. The crib (right view) supported the span while a steel framed pier was built under the end.

of the span by two sets of hand winches, helping to rotate the bridge about the shoes. The span weighed 800 tons, and it was estimated that at least one-quarter of this weight had to be lifted.

After the 22-ft. raise had been attained, the load to be handled was less because of the smaller angle of inclination of the bridge, and it was possible to dispense with the jacks on the cribbing in raising the span the remaining 33 ft. As a safety precaution, however, piles were driven outside the crib to support needle beams set at about 25-ft. elevation to take part of the load during final raising.

Once the bridge was in a horizontal position, the pier under the end was erected, and the weight transferred from the cribbing to roller bearings on this pier. Since the canal was watered before this pier could be built, its bottom section had to be set under water. Moreover, the water coming into the canal caused the bank to slide and a sheetpiling cofferdam had to be driven around the pier, also requiring underwater work. Floating ice complicated the job, and divers could not work more than ten minutes at a time because of the cold water. Nevertheless, the bridge was completed and in service Feb. 1.

Not far south of this bridge, at Vroenhoven, and also across the deep cut section of the canal, is another bridge worthy of mention because of its spectacular nature. Designed and built by the Belgians, with some help from us in the form of equipment, it is a five-span plate girder structure built to replace a three-span concrete arch. Its spectacular quality rests largely in its supports which reach a maximum height of 80 ft. and, as shown in Fig. 8, consist of concrete bents, each of whose two legs consists of a four-column pyramidal tower. The columns are each about 12 in. square and were poured in place.

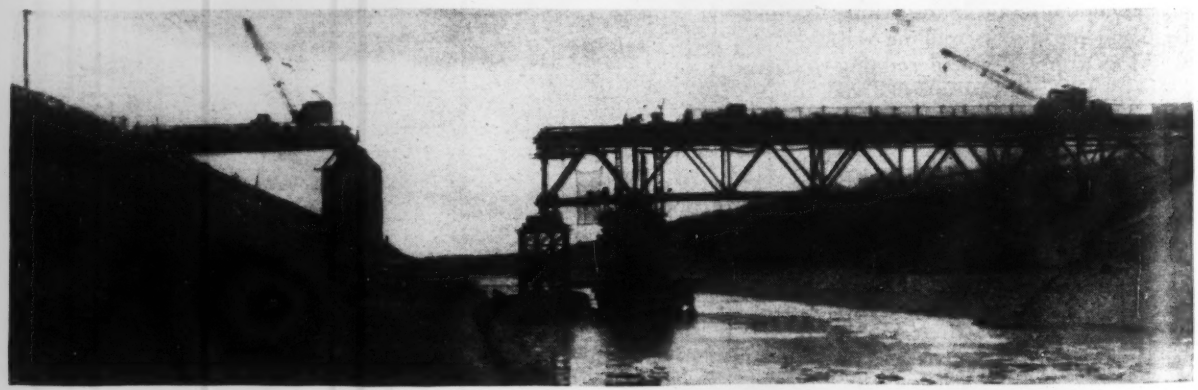


Fig. 7. Veldwezelt bridge raised to final position on its new steel pier. When the second girder span was erected and the cribbing in the channel removed, the job was completed. Note that the canal is full of water in contrast to its dewatered condition in Fig. 6.

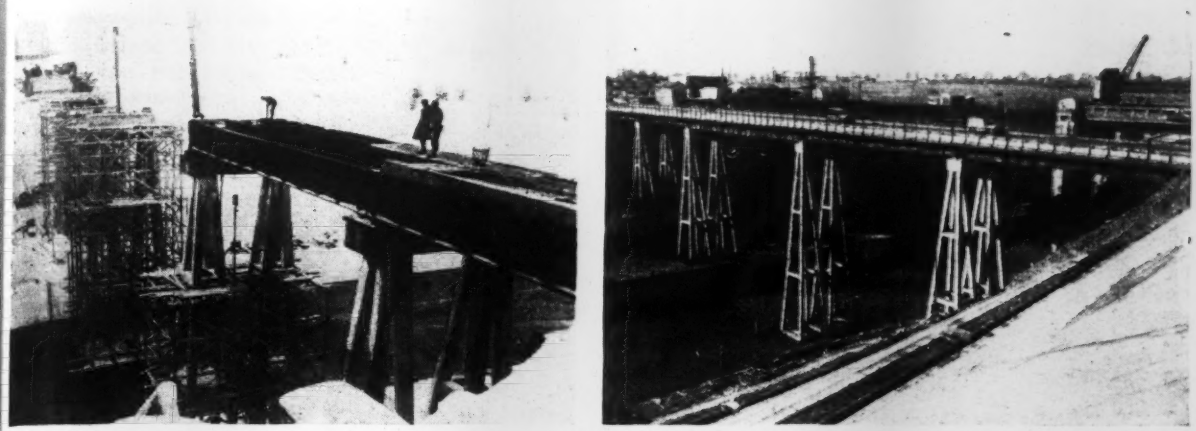


Fig. 8. Unusual steel girder bridge at Vroenhoven has 80-ft. high concrete bents with pyramidal four-column legs, poured in place, and a deck of precast units on which a poured slab was eventually placed. Note gin poles in left view, used to erect girders from completed deck of bridge.

concrete being brought out in the bucket of an 800-ft. span cableway.

The Vroenhoven bridge is also interesting in other respects. When the concrete bents were complete its five spans of plate girders, from 60 to 89 ft. long, were erected with the aid of gin poles set up on top of the bents at the ends of the span being worked on, as shown in the accompanying illustration. Power was supplied to one gin pole by a double-drum hoist on one bank and to the other by the winch drum of a crawler tractor on the opposite bank. The girders, 69-in. deep, were brought out onto the bridge on industrial railway cars.

As a final distinction, this unusual bridge is equipped with a deck of precast concrete units or slabs, 2x8 ft. in plan dimensions, about 5 in. thick and flanged at the ends. Spanning from girder to girder, the units are planned to serve as forms for a poured reinforced concrete deck. At the time of this writing there had not been time to finish the bridge according to plan and the units were being covered with a timber plank deck. This reduced the capacity of the bridge considerably, and it was hoped that the concrete slab deck could be installed at an early date.

Rewatering the canal

Removal of the earth dams which had been built across the canal to serve as roads or to cofferdam a section where bridge or lock work had to be done in the dry was not a simple job of earthmoving because of the danger of washing out the canal banks when the water rushed back in. Accordingly, some means was sought to equalize the water levels on both sides of the dams before the final cut was opened. Attempts to do this were made by Belgian contractors using siphons over the dams. However, this procedure proved too slow in one case, and Engineer troops, working day and night, jacked six 24-in. pipes through the fill. These pipes permitted water to be admitted rapidly but evenly until there was a difference in head of only about 5 ft. In the meantime a sandbag weir (Fig. 9) had been built against the inside face of the dam, and water was finally admitted to this through a cut in the embankment. Then by pouring over the long crest of the weir, the water created no undue currents, and no washing of the banks resulted.

As stated earlier, the Albert Canal work was done by the 1056th Port Construction and Repair Group, of which Col. J. B. Cress was commanding officer. The largest unit of the group was the 355th Engineer General Service Regiment in command of Col. T. A. Adcock. Maj. P. F. Cox, formerly in the bridge department of the Massachusetts highway department, was planning officer, and Maj. R. F. Pyle, a dredging contractor from Virginia, was in charge of field supervision.

Fig. 9. Dam removal operations incident to refilling a section of the canal. Water is entering through three submerged pipes at either side, while dragline is cutting down the crest of the dam to permit water to flow into area inclosed by sandbag weir in center. Objective is to equalize water levels without setting up scouring currents by permitting water to discharge over long weir.

Fig. 1. Scott Circle Tunnel in Washington, D. C., is an example of a short vehicular tunnel requiring mechanical ventilation to eliminate carbon monoxide hazards. Vents for the two fans required in each tube are located in the rotary of the upper roadway.

Carbon Monoxide Control In Short Vehicular Tunnels

Gerard I. Sawyer
Structural Engineer, Office of Municipal Architect
Washington, D. C.

***Contents in Brief**—Carbon monoxide concentrations represent hazards to public safety even in a vehicular tunnel as short as that required by a highway grade separation. How the structural engineer can easily and quickly determine the ventilation requirements of such a structure is told in the following.*

LIKE MANY MUNICIPALITIES now looking ahead to speeding traffic flow along city streets in the postwar era, Washington, D. C., has found that the solution to the problem will involve construction of grade separation structures. Some of these will be long enough to be called short tunnels, and will therefore involve design consideration of carbon monoxide control.

Unlike long vehicular tunnels, where the handling of this toxic gas calls for the services of a ventilating engineer, the problem in short tunnels is so simple that the structural engineer can easily work out the solution in a few minutes. To do this, however, he must familiarize himself with a few basic principles.

Traffic in a vehicular tunnel is constantly generating carbon monoxide. Therefore, sufficient air must be supplied to the tunnel to prevent gas concentrations from exceeding 4 parts in 10,000 parts of air. This is the safe limit recommended for vehicular tunnels by the U. S. Bureau of Mines in a report to the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission ("Ventilation of Vehicular Tunnels", A. C. Fieldner and others, U. S. Bureau of Mines, 1927, reprinted from *Journal* of the Am. Soc. of Heating and Ventilating Engineers, Jan.-Dec., 1926).

No doubt the argument will be advanced that a tunnel such as that in Figs. 1 and 2 should not need ventilation because traffic flow would induce longitudinal ventilation sufficient to handle anything but a concentrated traffic stoppage with vehicle engines running. Ventilation for this condition would, at first appearance, seem to be unjustifiably costly, since the necessary facilities would be such that capacity or near capacity operation would be used for only a small part of the time.

Experience, however, indicates that although they are idle most of the time, fans installed in two underpass tunnels at Washington, D. C., have been called on frequently to supply the proper proportion of air to the tunnels. The contribution of these fans to public safety has certainly been proven. And when public safety is involved many engineers hesitate about ignoring provisions which may promote it.

So far as the cost of ventilating equipment is concerned, it has been found that this item is but a very small fraction of the total cost of the improvement. In Washington, for example, it is estimated that installed carbon monoxide control equipment runs from 1 to 2½ percent of the total cost of an improvement.

It is apparent, then, that the problem in vehicular tunnel ventilation is

to determine the size and number of fans needed to maintain carbon monoxide content below the recommended safe limit under the most adverse traffic conditions, and to determine the number of "minute-air-changes" necessitated by these conditions. The term "minute-air-change" refers to the time required by the fans to remove a volume of air equal to that of the tunnel. Solution of a typical problem will, perhaps, best illustrate the procedure followed in determining what ventilation is needed in a short vehicular tunnel.

Solution of a problem

For the hypothetical problem a 2-lane tunnel is assumed to have a length of 282 ft. and a volume of 104,000 cu. ft. The roadway grade is 3 percent, and 2,500 vehicles use the tunnel each hour, travelling at an average speed of 6 mph. Traffic is classified as 90 percent passenger cars and 10 percent trucks.

As a first step in the solution of this problem it is necessary to determine the distance along which each vehicle distributes its carbon monoxide fumes. This distance is equal to the spacing of the vehicles. Since all of them are assumed to travel 6 mph., we have:

$$\text{Passenger car spacing} = \frac{6\times5280}{2250\div2} = 28.2 \text{ ft.}$$

$$\text{Truck spacing} = \frac{6\times5280}{250\div2} = 253.4 \text{ ft.}$$

It should be stated here that this spacing is a theoretical one, computed for the purpose of determining the volume of carbon monoxide generated per lineal foot of lane.

CARBON MONOXIDE GENERATED BY GASOLINE-DRIVEN VEHICLES UNDER AVERAGE LOAD CONDITIONS

Cu. Ft. per Hr. at 65 Deg. F. and 29.92 in. Mercury

(Adapted from U. S. Bureau of Mines report "Ventilation of Vehicular Tunnels")

Test condition	5-passenger cars	7-passenger cars	Trucks, up to 1½-ton	Trucks, 1½ to 3-ton	Trucks, 3½ to 4½-ton	Trucks, 5-ton and over
Car standing, engine racing	60.7	105.0	67.9	55.8	158.2	105.2
Car standing, engine idling	33.4	33.1	31.0	13.2	66.4	50.5
15 mph. down 3% grade	41.4	69.2	48.5	77.8	109.0	....
10 mph. down 3% grade	32.4	41.8	38.8	59.5	97.8	90.0
6 mph. down 3% grade	....	....	....	28.9	55.0	54.5
3 mph. down 3% grade	28.8	44.4	37.2	....	....	....
Accelerating from rest to 15 mph. up 3% grade	71.4	144.0	65.1	....	....	....
15 mph. up 3% grade	77.0	141.2	95.6	133.5	183.9	....
10 mph. up 3% grade	54.8	100.0	74.3	134.7	138.1	181.6
6 mph. up 3% grade	....	....	....	99.7	132.6	148.3
3 mph. up 3% grade	41.8	81.5	54.9	....	....	....
Accelerating from rest to 15 mph. on level	72.9	120.1	60.4	....	....	....
20 mph. on level	72.8	137.0	94.0	....	....	....
15 mph. on level	60.7	104.8	71.7	103.9	131.2	....
10 mph. on level	45.8	71.4	59.8	104.0	147.6	151.6
6 mph. on level	....	....	....	67.6	92.6	110.3
3 mph. on level	36.3	53.1	47.4	....	....	....

From the accompanying table, a 5-passenger car travelling at 10 mph. generates an average of 54.8 cu. ft. of CO per hr., and the same car travelling at 3 mph. generates 41.8 cu. ft. per hr. By interpolation, we find that a 5-passenger car travelling at 6 mph. will generate 27.64 cu. ft. per hr., or 0.79 cu. ft. per min. In like manner, trucks over five tons, fully loaded, will generate 2.72 cu. ft. per minute when travelling at 6 mph.

Therefore, cars will generate $\frac{0.79}{28.2} = 0.0280$ cu. ft. of carbon monoxide per min. per lineal ft. of lane, and trucks will generate $\frac{2.72}{253.4} = 0.0107$ cu. ft. The total of these two figures is 0.0387 cu. ft. per min. per lineal ft. of lane.

In order to maintain the ratio of carbon monoxide at less than 4 parts in 10,000 of air, 2,500 cu. ft. of air

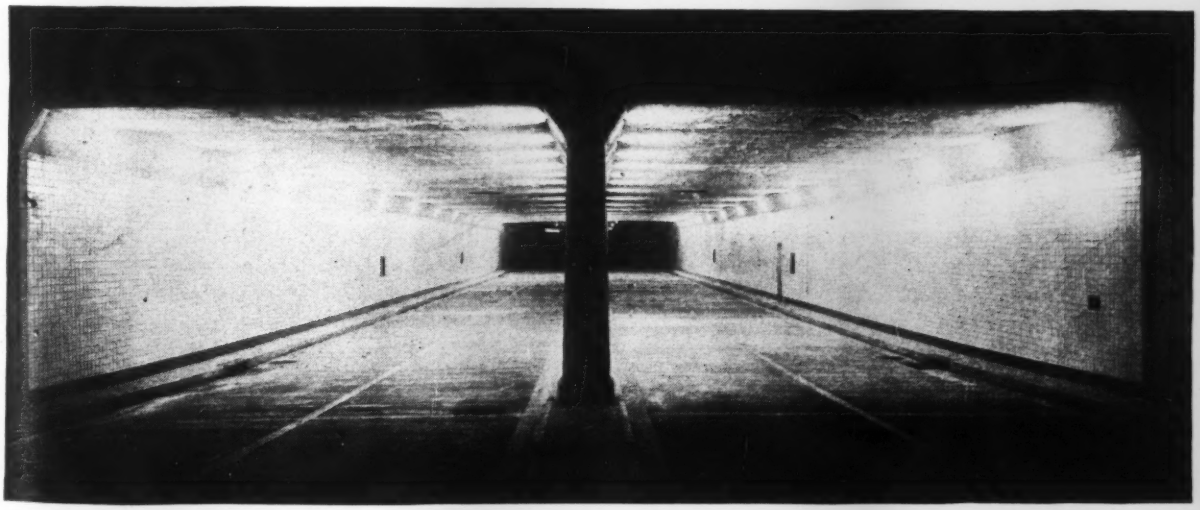


*Fig. 2. **Interior view of the 222-ft. long double-tube closed frame tunnel at Scott Circle shows fan ports in ceiling. Door in right wall of right tube leads to an underground room housing the drainage pumps, lighting system controls and carbon monoxide recording equipment.***

have to be supplied for every cubic foot of gas generated. Or, per linear foot of tunnel, we need $0.0387 \times 2 \times 2{,}500 = 193.5$ cu. ft. of air per min. Since the tunnel is 282 ft. long, the amount of air to be supplied is equal to $282 \times 193.5 = 54{,}567$ cfm.

If two fans are used to supply this volume of air, each fan will have to deliver 27,284 cu. ft. of air per min. The size of the fan which can deliver that volume of air can easily be selected from a fan manufacturer's catalog. The minute-air-changes maintained by fans of this size is

$$\frac{54{,}567}{104{,}000} = 1.91 \text{ m.a.c.}$$

A number of other conditions that may take place in the flow of traffic through a tunnel are listed in the table. Perhaps the worst of these is the case where all cars are accelerating from rest to 15 mph. An accurate traffic count in the vicinity of the tunnel is, of course, necessary in order to determine the maximum truck traffic expected.

Whatever condition the structural engineer selects, the method of solution will be similar to that described above, even for the problem of ventilating a large garage. In this latter case the carbon monoxide generated is computed for idling cars.

Special Equipment Designed for Painting Highway Center Stripes

One of the most successful procedures of applying the paint for center traffic stripe on North Carolina highways is that employed by crews in division one of the state highway department. With this method one pick-up truck and one 1-½-ton truck are used as illustrated by the accompanying photographs.

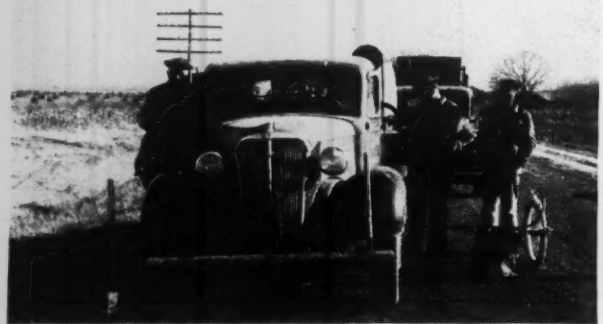
The first truck (left) is equipped on the right front with a short piece of steel rod held in a vertical position by an adjustable support. This rod (marked at the bottom with a white cloth and shown at left in the photograph) is used for a guide and is made to travel along the edge of the pavement by an operator sitting on a seat projected beyond the right side of the truck cab; this operator steers the truck only, he does not shift gears.

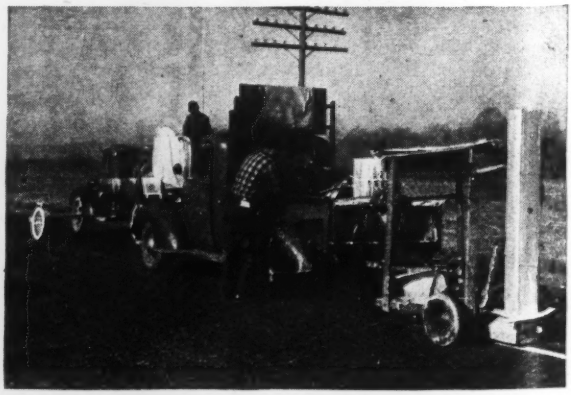
On the left side of the vehicle a bicycle wheel attached to a frame extending about 5 ft. beyond the truck is used to mark or "spot" the center of the pavement. In this operation, a valve at the end of a rubber hose, extending from a container on the back of the truck to the bicycle wheel, is adjusted to allow a mixture consisting of about one quart of white paint in five gallons of gasoline to drip on the wheel. The first truck also transports the supply of paint used in painting the 4-in. wide traffic stripe put down by the crew of the second truck; the paint needed by this crew is mixed in a 50-gal. barrel in the first truck, power for the mechanical stirrer in the barrel being supplied by a ½-hp. gasoline engine.

At the rear of the second truck (right) a 22-cfm. gasoline-powered compressor is available to supply the pressure for spraying the paint for the finished stripe. An operator riding in the pneumatic-tired trailer, shown at the right in this picture, controls application of the paint. By means of a special hitch equipped with a "steerable" tongue taken from a McCormick Deering farm mower this operator can also control the path of the trailer sufficiently for the minor adjustment necessary on curves. In addition, this operator also releases at about 50-ft. intervals a 4 x 4 x 6-in. wood block from the chute shown at the extreme right in photo; these blocks are used to keep motorists from crossing the stripe of fresh paint and are picked up by a follow-up crew using a supply truck as quickly as the paint is sufficiently dry.

The pictures show a center stripe being painted on a 20-ft. wide bituminous concrete surface put down as a "boom-drag" application on a pavement built in 1922, a rather rough finish being provided. By applying the paint with a compressed air spray gun about 8 gal. of paint are required for painting a mile of 4-in. continuous stripe.

By use of the two trucks a minimum crew of six men can paint between 25 and 35 miles of traffic stripe daily. The equipment is used under the general direction of B. W. Davis, state maintenance engineer, and J. C. Gardner, division engineer.





Center line of roadway is marked with diluted white paint dripping on bicycle wheel at right side of truck. A second truck (right) is equipped with air compressor used to spray on finished stripe. Small wood blocks are dropped at 50-ft. intervals from the chute shown at rear of truck to prevent motorist crossing freshly painted stripe.

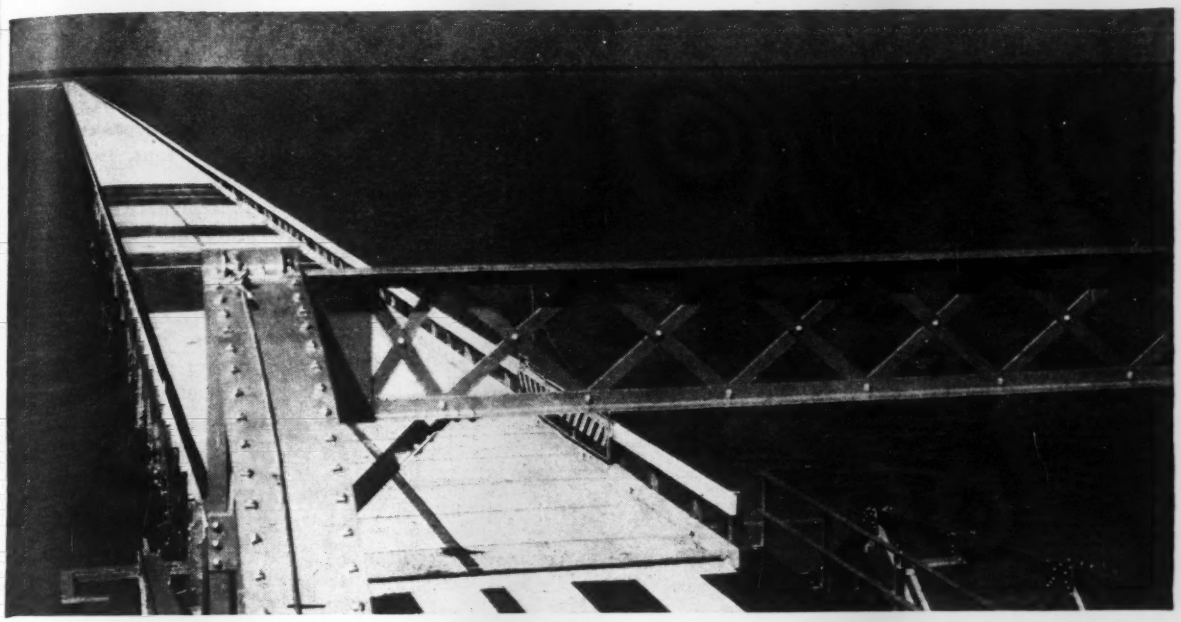


Fig. 1. Loading tests proved the practicability of higher bearing value for the piles and saved $24,500 on this bridge.

Pile Tests Justify Increased Loading

W. A. King
Senior Resident Engineer
Texas Highway Department

***Contents in Brief**—Results obtained from load-bearing tests on piles for a long causeway verified the engineer's judgment that the driving requirements of the "Engineering News" formula could be safely reduced in this particular location with a resulting saving of $24,500. The tests indicated a factor of safety of 5.87 for the formula in driving wood piles with a drop hammer, thus reaffirming the factor of safety of 6 under the conditions for which the formula originally was established in 1888.*

DRIVING SPLICED TIMBER PILES to a bearing value of 10 tons by the *Engineering News* formula resulted in damage to the piles and indicated necessity for redesign of the pile bents for reconstruction of a causeway across Lavaca Bay eastward from Port Lavaca, Texas. To reduce the amount of driving necessary, thus avoiding damage to the piles, it seemed necessary to use an additional pile in each of some 300 bents. However, it was found, by load tests, that adequate load capacity could be obtained by driving to a computed bearing of only 5 tons.

The Lavaca Bay Causeway, built in 1931, was seriously damaged by a severe Gulf storm in September, 1942, necessitating extensive repair work. The structure, 10,300 ft. long, consisted of 540 spans, each 19 ft. long and one single-leaf bascule span 50 ft. long. The 19-ft. spans had creosoted treated timber stringers with reinforced concrete floor slabs and were supported on treated timber pile bents.

Shortage of structural lumber made it necessary to resort to other materials where practical when replacing the bridge, and precast, reinforced concrete stringer spans with concrete caps and treated pile bents were used to complete the structure after salvaged materials were utilized. The new design required a bearing capacity of 10 tons per pile with a minimum of 35 tons per bent; specifications provided that the bearing value of the piles be determined by the *Engineering News* formula.

Design for support of the bridge required four piles per bent and provided that additional piles be driven if necessary to obtain the total resistance to driving of 35 tons per bent. Each pile was composed of two sticks — the upper section 32 ft. long being given a 24-lb. full-cell creosoted treatment while the lower section varying in length from 35 to 50 ft. was untreated. The splice was four 6x6-in.x8-ft. untreated pine timbers secured with ¾-in. galvanized bolts.

The material into which the piling was driven was primarily silt with

some shell strata. Soil analysis showed that only one percent was retained on the ¼-in. sieve and four percent on the 40-mesh sieve. The soil constants were determined to be as follows: Liquid limit 52, plastic limit 23, plasticity index 29 and linear shrinkage 16. The material had very good adhesive qualities and produced high skin friction on the piling.

Treated pile failed near splice

Observations made early in the driving operations indicated possible damage to the piling in obtaining the bearing value originally specified and two of the piles were pulled and examined. Inspection showed that the treated section was beginning to fail near the splice, the wood fibers breaking and separating at about 1 ft. above the joint.

To prevent possible damage to the treated timber it appeared necessary to reduce the driving to about 7-ton bearing. However, such reduction of bearing would require that one additional pile be added in each bent to maintain the 35-ton design value, and this would cost some $26,000. Before such expenditure was authorized, therefore, test piles were driven to determine the actual safe bearing value of the piles.

Three test piles were driven, each with treated upper section 32 ft. long and an untreated lower section 52 ft. long, spliced as described above. The piles were driven under identical conditions and with the same equipment as that used for the permanent piling. Driving was done with a 3,290-lb. drop hammer, with its fall limited to a maximum of 5 ft. The test piles were driven at widely separated points in areas known to have the most unfavorable bearing conditions.

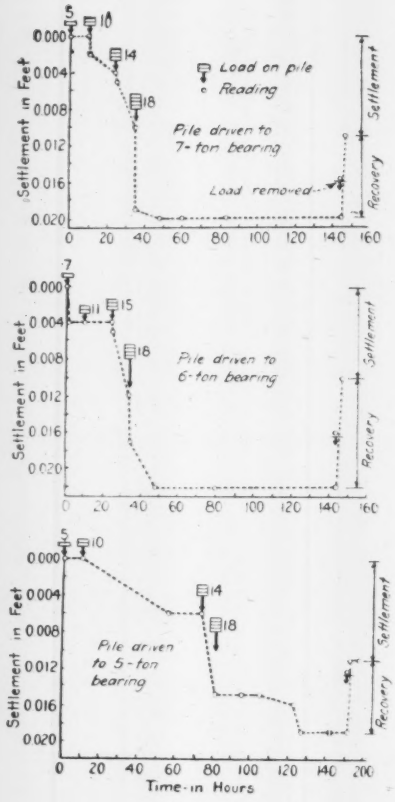


Fig. 2. Piles driven to a computed bearing of 7, 6, or 5 tons safely supported an 18-ton test load.

The test piles were driven to 7-, 6-, and 5-ton bearing resistance respectively as computed by the *Engineering News* formula. Since the required bearing for each pile in a four-pile bent had to be 9 tons, to assure a total capacity of 35 tons, each pile was loaded, by increments, to a maximum of 18 tons, twice the required bearing.

A load increment was applied as early as practicable each morning, with the next increment added late in the afternoon. Action under the increasing load was carefully recorded as shown in Fig. 2. It will be noted that for the three computed bearings, 7, 6, and 5 tons, the settlement was almost exactly the same under the same load, about 0.02 ft. (¼ in.) with a recovery, after the 18 ton load was removed, to 0.01 ft. indicating an actual settlement and compression of 0.01 ft.

Pile failed under 33-ton load

The pile driven to a computed bearing of about 5 tons was reloaded to failure, which occurred under a 33-ton load. The test data indicated that a 28-ton load could be supported by the 5-ton pile giving an accurately computed factor of safety of 5.87. This compares with the factor of safety of 6 originally ascribed to the formula when it was established in 1888, primarily for timber piles driven with a drop hammer.

The pile load tests verified the thought that for the particular use in adhesive soil a much higher bearing value of the piles could be used than was indicated by the *Engineering News* formula. Piles were driven

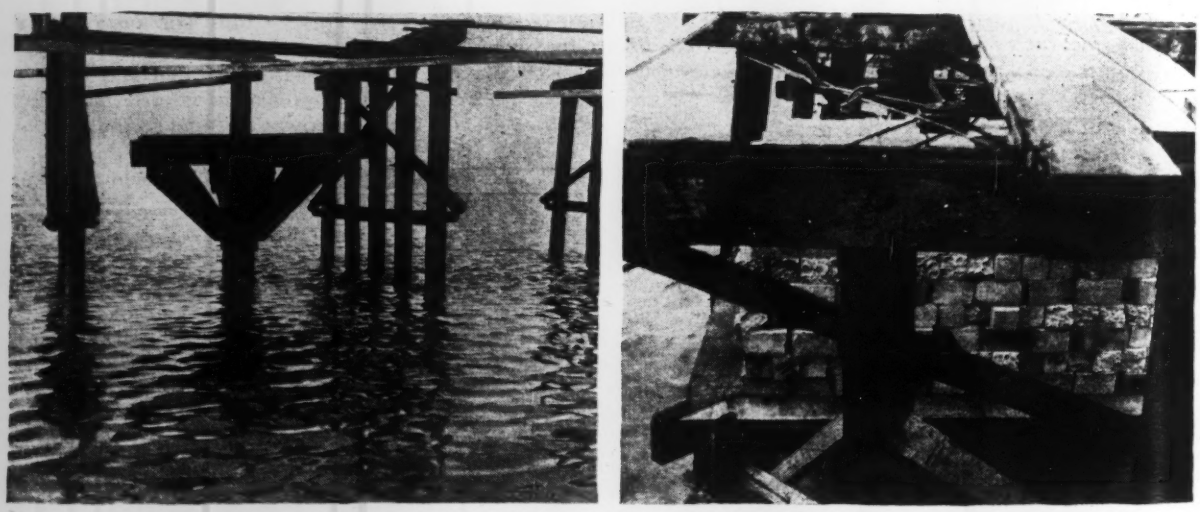


Fig. 3. The load platform was made of salvaged timbers. Note torque-resisting brace at lower left in illustration at right.

to only 5-ton computed bearing yet have an estimated factor of safety of 3 for the 9-ton assured load capacity.

Mechanics of pile loading

After driving, the piles to be tested were cut off so they were 12 ft. above the water surface, and a 10-ft. square timber platform made up of old concrete test beams was built to carry the test load. The top of the pile was guyed with ropes in four directions to maintain it in a vertical position. The tendency of the pile to twist under loading was resisted by braces operating in a slot at each corner of the platform (Fig. 3). This device kept the platform rigid while permitting free vertical movement. A drift pin driven vertically into the top of the pile established a fixed point for level readings. The instrument was set on a section of the original bridge, and two bench marks established at about equal distances at right angles to the level. A check on the bench marks was made prior to each reading, an ordinary level and level rod being used with a target set to the nearest 0.001 ft.

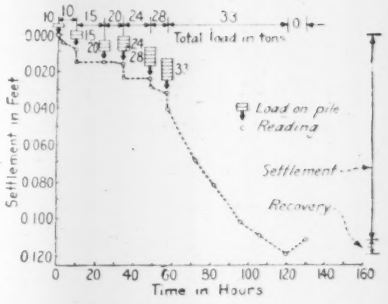


Fig. 4. The pile driven to 5-ton bearing was reloaded and tested to failure. It safely supported a load of 28 tons, indicating a factor of safety of 5.87 for the "Engineering News" formula.

The cost of the entire test was $270 for piles and driving, $940 for the platform and for loading and unloading of weights plus $140 for engineering; a total of $1,350. Net saving, which can be attributed to use of test data and elimination thereby of added piles, was about $24,500.

Driving of the test piling was performed by Moore and Turner, contractors for the reconstruction of the causeway. The work was under supervision of the Texas Highway Department, M. C. Welborn, district engineer, the author as senior resident engineer and J. L. Jackson, acting junior resident engineer. Joe D. Guidry was field engineer and D. A. Logan was office engineer.

Legislation Enacted in 13 States For Housing and Urban Redevelopment

Legislatures of thirteen states this year cleared the way for increased housing and urban redevelopment activities through enabling legislation and allocation of additional funds for the purpose. Georgia, Illinois, Nevada, New York, Pennsylvania, Tennessee and Washington enacted legislation facilitating action in the housing field, the National Association of Housing Officials reports. Urban redevelopment legislation was adopted by Illinois, Colorado, Arkansas, Minnesota, Indiana, Pennsylvania and Tennessee, according to the American Society of Planning Officials. The Ohio senate has just passed a bill providing for slum clearance under the right of eminent domain.

In the housing field Nevada amended its war housing act of 1943 so housing authorities could cooperate with the federal government in providing homes for war veterans and low-income families. New Illinois and Pennsylvania legislation authorizes insurance companies to invest up to 10 percent of their assets in housing.

An act permitting capital investments in housing by social security and retirement funds became law in New York recently. The law made housing authority bonds legal investments for state, city and other bank deposits. State housing activity in New York will be extended through adoption of two other measures. One authorizes a referendum to increase the annual state housing subsidy from $4,000,000 to $6,250,000—sufficient to provide subsidies for a total state housing program of $220,000,000. The second act adds $35,000,000 to the state housing debt authorization, the added amount bringing the total state housing debt up to $220,000,000.

Adopted in April in New York was an act permitting cities to acquire, by purchase or condemnation, real property for redevelopment.

Pennsylvania passed legislation permitting insurance companies incorporated in other states to invest in Pennsylvania dwelling projects as much as their home states allow. Urban redevelopment authorities may be established under another Pennsylvania act, and a companion bill permits state aid to such authorities either through grants or loans.

Housing authorities in Washington were given the right to extend operations to cities, towns and rural areas outside the area authorized originally, while Georgia adopted supplemental legislation extending rural housing powers of housing authorities.

In the urban redevelopment field, Colorado adopted a rehabilitation act permitting local planning commissions to prepare development plans for substandard areas through exercise of eminent domain. Authorities are to clear the land and sell or lease it to reconstruction agencies for improvements in accordance with planning commission development plans. Funds for each authority's program will be provided through municipal appropriations. No tax-exemption privileges are offered to the reconstruction agencies.

Arkansas and Minnesota both adopted urban redevelopment laws during current legislative sessions. The Minnesota law provides for the eradication of slum and blight areas through formation of neighborhood redevelopment corporations. The measure rejects all public-fund participation, but authorizes private concerns and insurance companies to take over slum areas for building homes, through condemnation proceedings after purchase of 60 percent of the property.

Tennessee's legislature approved an urban redevelopment act that authorizes any housing authority to acquire blighted areas and to clear areas, to make land in a redevelopment project available.

Special Steel Forms Speed Concreting

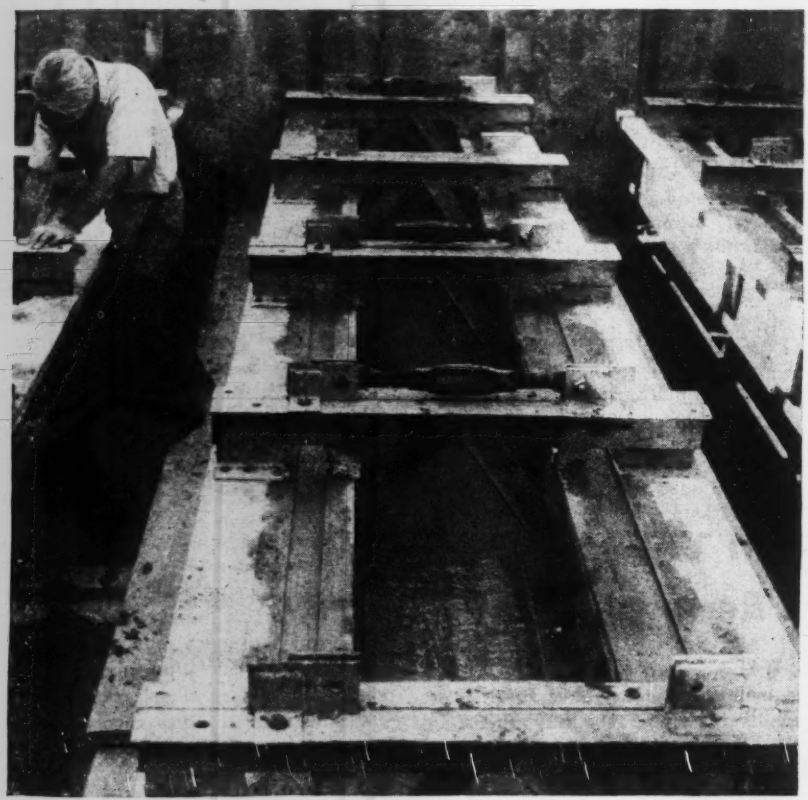


Fig. 1. Reinforced concrete washwater troughs in a filter plant utilize adjustable steel forms to expedite the work.

Contents in Brief—*Special steel forms expedited the pouring of 720 reinforced concrete washwater troughs at Chicago's South District Filtration Plant. Other labor saving devices included a roller-mounted concreting platform and a special lifting frame for setting forms, operated by an overhead hoist traveling along temporary trolley beams.*

CAREFULLY PLANNED construction sequence and reusable forms invariably pay dividends in concrete work. A noteworthy example of this procedure was demonstrated recently at the Chicago South District Filtration plant where the contractor was faced with the problem of pouring 720 reinforced concrete washwater troughs, each 25 ft. 9 in. long, in connection with the installation of 80 rapid-sand filters and 100,000 lin. ft. of cast iron pipe underdrains.

Two requirements in the construction of the troughs made the use of steel forms extremely advisable, if not mandatory. One was that the lips, or top edges, of all troughs must be built level and to within $\frac{1}{32}$ in. of the required elevation. The other was that the narrow side walls and thin bottom slab required precision forming.

Each trough has an inside opening 26 in. wide and 17 in. deep at its centerline. Side walls are 3 in. thick with their tops curved to a 3-in. radius forming a lip. The bottom slab is 3 in. thick at the center, sloping up to 4 in. at its junction with the walls. Each trough contains about 1.4 cu. yd. of concrete.

The general arrangement of the 80 filters was conducive to an orderly sequence of pouring the washwater troughs. A single battery of ten filters is located at each end of the filter building with three double batteries of 20 filters each located in between. Four 39-ft. wide filter operating galleries between the five batteries of filters provided ample working space for cleaning forms, assembling reinforcing, storing aggregates and mixing concrete.

Best construction progress was secured by pouring all nine washwater troughs in any one filter in one day's work. To keep on this schedule, 18 sets of removable steel forms were built specially for the job, permitting nine to be moved while concrete was being placed in the others. An extra set of bottom plates for nine additional troughs also was used to expedite the work.

Special steel forms

Basically, the steel forms were composed of two elements; four side plates for forming the walls of the troughs, and a bottom plate, which was bolted to the side plates after they were correctly positioned. The side plate assembly, reinforced with plates and angles and carrying a heavy steel plate along each side for a walkway, had six adjustable ties across the top.

Each tie included a turnbuckle operating on two threaded bolts anchored to two steel angles. By welding one of these angles to one outside form and to the opposite inside form, while the other was welded to the remaining two forms the turnbuckle could be operated to either spread all four forms apart for cleaning or to bring them together to give the correct wall thickness. Drift pins locked the side forms in correct position when placing concrete and when cleaning, transporting or setting the assembly.

Original plans contemplated the use of self-supporting steel washwater troughs. But when WPB restrictions

At Chicago's Water Filtration Plant

on steel caused the adoption of reinforced concrete construction it was necessary to provide a support for the end of each trough at one wall of each filter. This was secured by chipping a 2-in. recess, 12 in. high and 32 in. wide in the existing filter wall and doweling three expansion bolts into the wall to support each trough.

The other end of the trough was supported in an opening in the gullet wall provided originally for the steel troughs. A small additional amount of concrete was added in the bottom of each opening to build them up to the bottom of the concrete troughs.

Another important installation, which was made prior to pouring the concrete washwater troughs, was that of placing 54 special 6x4-in. cast iron tees for underdrains, on the centerline of each filter. These were properly positioned and embedded in concrete by placing a 4-ft. width of filter slab

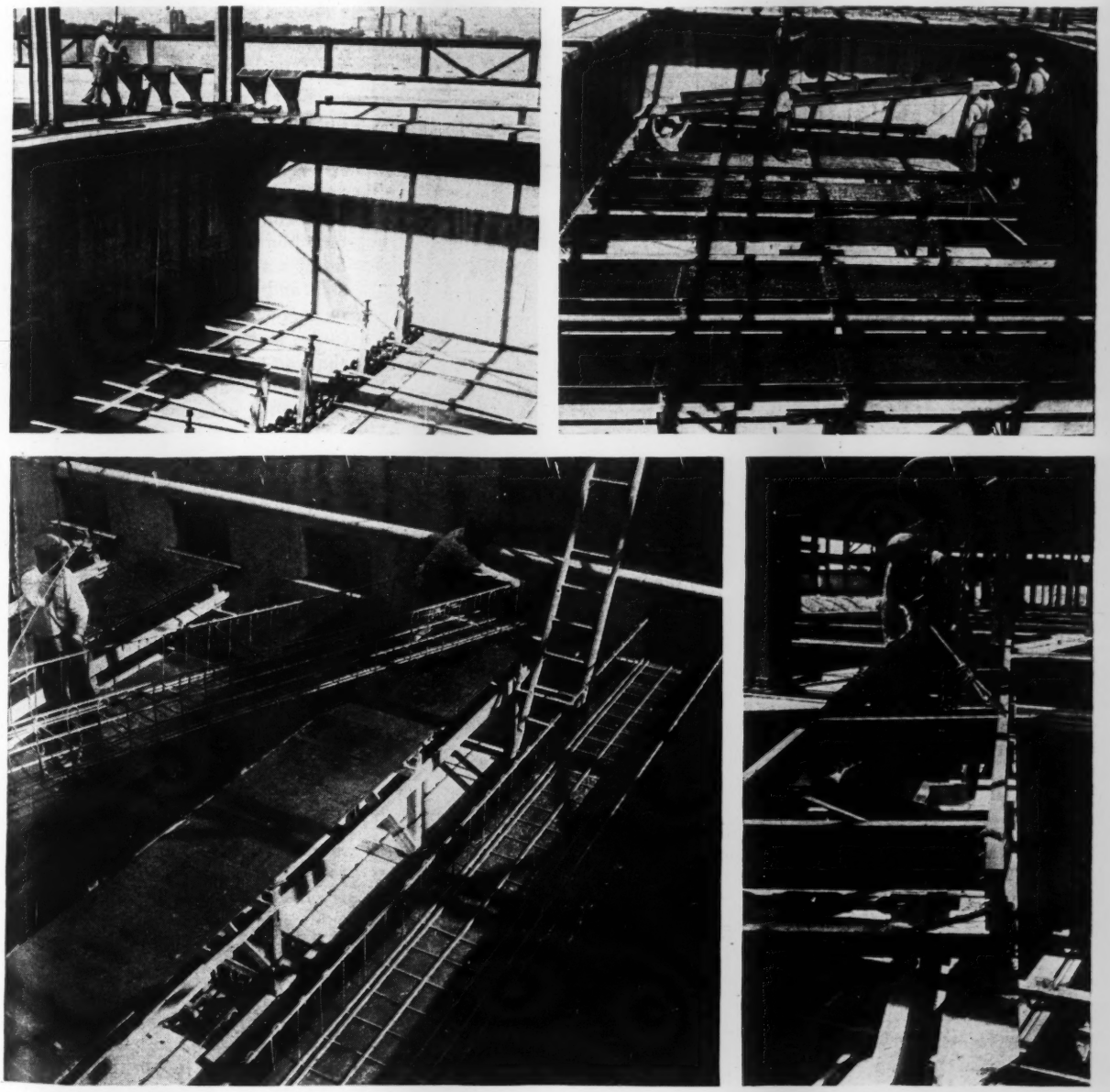
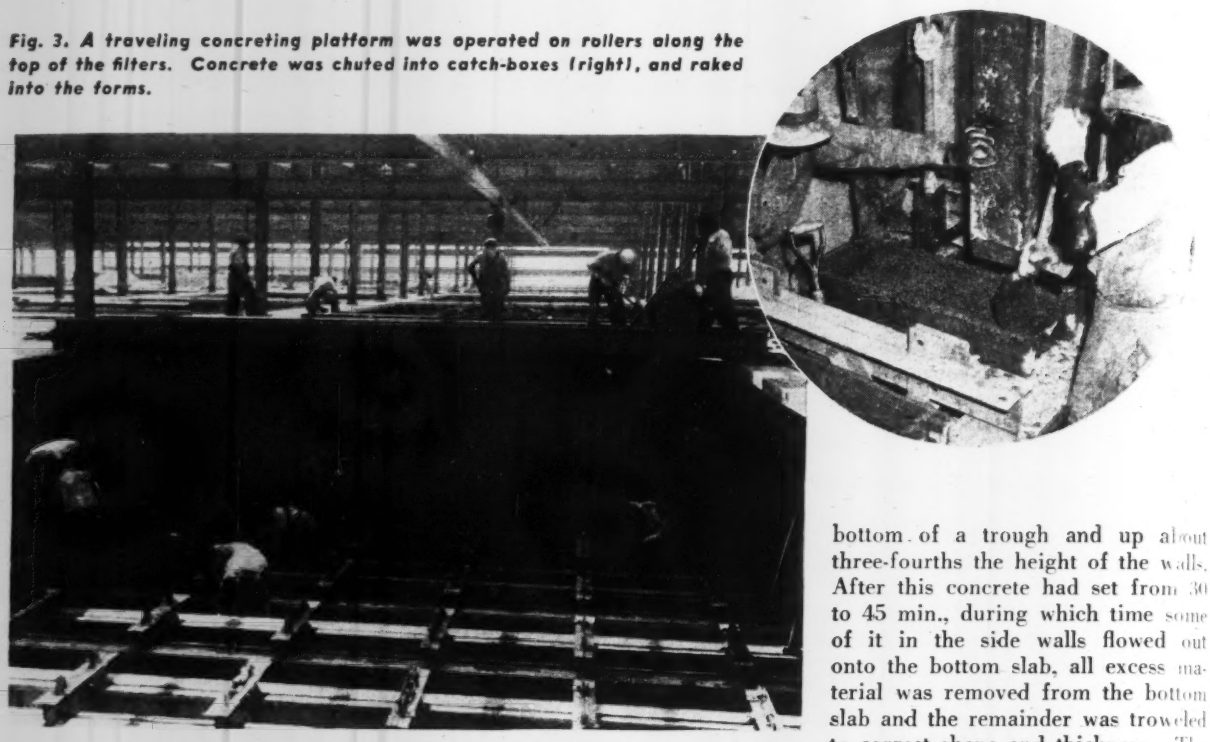


Fig. 2. Basic steps of construction include: (A) installing the underdrain tees and adjustable supporting frames, (B) placing the bottom forms, (C) positioning the reinforcing cages and (D) lowering the side-form assembly into position with an overhead hoist.

Fig. 3. A traveling concreting platform was operated on rollers along the top of the filters. Concrete was chuted into catch-boxes (right), and raked into the forms.



that had been omitted when the filters were constructed.

The system of underdrains comprising 108 perforated cast iron pipes 4 in. in diameter and 12 ft. 2½ in. long was installed in each filter after the washwater troughs were completed. Perforations in the pipe were formed with ½-in. dia. brass eyelets spaced 6 in. apart along the bottom of the pipe. Underdrains were supported on concrete sills about 1½ in. above the floor of the filters.

Construction sequence

First operation in constructing the nine washwater troughs in any filter, following the installation of underdrain tees, was to set five supports for the troughs; one at each end, one at the center and one each at the one-quarter points. Steel plates forming the bottom support for the troughs were placed on top of these frames, which were made of 4x4-in. timber legs cross-braced and mounted with screw jacks to bring the bottom of troughs to correct elevation. The bottom plates were coated with a thin film of oil and all-welded reinforcing steel cages for the side walls and bottom slab of the troughs were placed in position on the bottom plates.

Next, the side plate assembly was properly oiled, lowered into position around the reinforcing cages, adjusted to provide the correct wall thickness, and securely bolted to the bottom plates. Then, with everything in readiness the concrete washwater troughs were poured.

Concrete was mixed nearby, transported in buggies and chuted directly into the forms by means of a traveling platform developed specially for the job. This platform was made of two 12-in. I-beams spanning the width of a filter basin and operating on four 4-in. rollers moving back and forth on the 4-ft. 6-in. concrete walkway built integrally with the top of the filters. A runway for the concrete buggies was made with 2-in. timber planks resting on the inside bottom flanges of the supporting I-beams. Five swinging metal chutes attached beneath the operating platform permitted concrete to be dumped through five corresponding holes into any part of the troughs. To avoid segregation of materials, the concrete was chuted into catch-boxes resting on the special steel forms and raked into final position.

No steel plates were employed for forming the top, or inside, surface of the bottom slab. Concrete first was placed to a 2-in. depth over the entire bottom of a trough and up about three-fourths the height of the walls. After this concrete had set from 30 to 45 min., during which time some of it in the side walls flowed out onto the bottom slab, all excess material was removed from the bottom slab and the remainder was troweled to correct shape and thickness. The excess material was shoveled into the side walls and additional concrete added to bring them to correct elevation with a tolerance of minus zero.

The 3-in. circular lip at the top of the side walls was formed with an edging tool. Later, these lips were carefully surveyed and rubbed, if necessary, with a carborundum stone to within $\frac{1}{32}$ in. of correct elevation. Troughs were cured by covering them with burlap and spraying with water.

Removing the forms

In accordance with the specifications, side forms for the washwater troughs were removed not less than 24 hr. after pouring concrete. Bottom forms, except at the five points of support, could be removed at the end of three days. At the end of seven days the contractor was permitted to substitute 4x4-in. timber posts for the five adjustable supports. These timber supports were required to remain in place an additional 14 days.

In order to minimize the amount of steel plate required to support the bottom of each trough, nine separate plates were used instead of one extending the full length of the trough. One plate, 8 in. long, was placed over each of the five supports, and not removed until the concrete had cured 21 days. Four plates, each about

6 ft. long, were placed between the short plates and bolted to the side forms to form a continuous smooth bottom support for each trough. These larger plates were removed three days after the concrete was placed.

Another construction feature which substantially expedited the work and saved considerable labor was an overhead trolley system developed on the job. Taking advantage of the existing steel beams and columns previously erected to support the filter building roof, the contractor took some long 12-in. I-beam rafters and bolted them to the overhead steel framework directly over the centerline of the filters in which troughs were being constructed. A hand-operated chain hoist was modified to operate along the bottom flange of these beams to provide the lifting power for setting reinforcing cages, installing and removing the special side forms and bottom plates for the washwater troughs, and for moving the concreting platform from one filter to the next.

Welded reinforcing cages

Reinforcement for the washwater troughs, consisting of $\frac{3}{8}$-in. stirrups spaced 8 in. apart and six $\frac{3}{4}$-in. longitudinal bars, were welded into cages approximately equal in length to that of the troughs. They were fabricated on the site and wheeled by buggy to a point beneath the trolley beam at one end of a filter where the hoist could hook on and place them in final position.

To install and remove the 5,000-lb. special side-form assembly for the troughs, a steel frame was welded together out of 8-in. channels. It had a four-point pickup connecting to the hoist, and holes for bolting it to the assembly. This frame also was employed for installing and removing the bottom forms, as well as for moving the concreting platform.

All work connected with construction of the washwater troughs, such as removing, cleaning and replacing the forms, setting the reinforcing steel and pouring concrete, was prosecuted on such a systematic schedule that workmen could almost tell the time of day by the stage of operations.

Starting at 7:30 a.m., concrete for all nine troughs in a filter was poured in about $3\frac{1}{2}$ hours, in forms which had been installed the previous day. Immediately thereafter, removal of side-forms was begun from the previous day's pour and by noon forms had been removed from six troughs, cleaned and oiled. By 2:30 p.m. the remaining three forms had been removed, cleaned and oiled, reinforcing cages were set in place and all nine forms for the next day's pour were reinstalled. By 4:10 p.m. everything was lined up in readiness for concreting the next day, leaving 20 min. in which to clean up the job and put the equipment away. In general, concrete was poured only five days a week; the other work day (Thursday) being devoted to catching up with any allied construction operations which may have gotten behind schedule.

Installation of the concrete washwater troughs was part of a $197,000 lump sum contract which also includes the installation of cast iron underdrains and the sand and gravel filter beds. Robert Gordon, Chicago, is the contractor. W. Hart was superintendent of steel forms and Frank Miller was superintendent of concrete work on the troughs.

John S. Dean, engineer of waterworks construction, Department of Public Works, is in charge of the work, reporting to W. W. DeBerard, city engineer of Chicago. Carl G. Riggenbach, assistant engineer, is project engineer and John R. Baylis is engineer of water purification for the city.

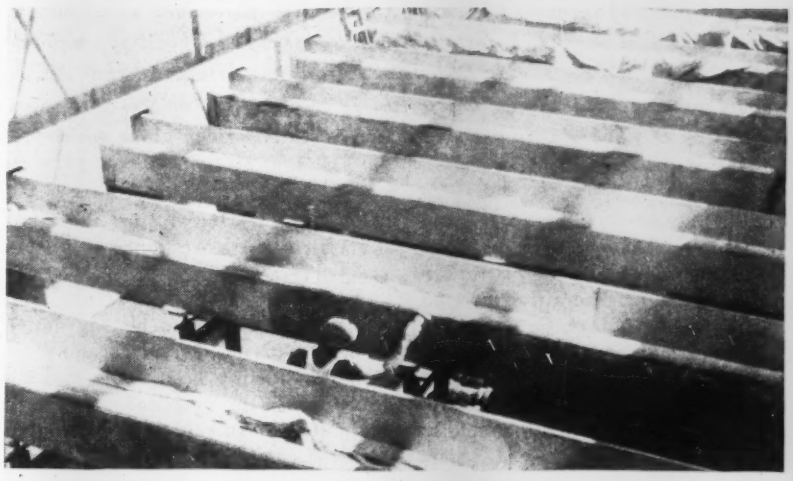


Fig. 4. Completed troughs were water-cured and rubbed with a carborundum stone to give a smooth surface.

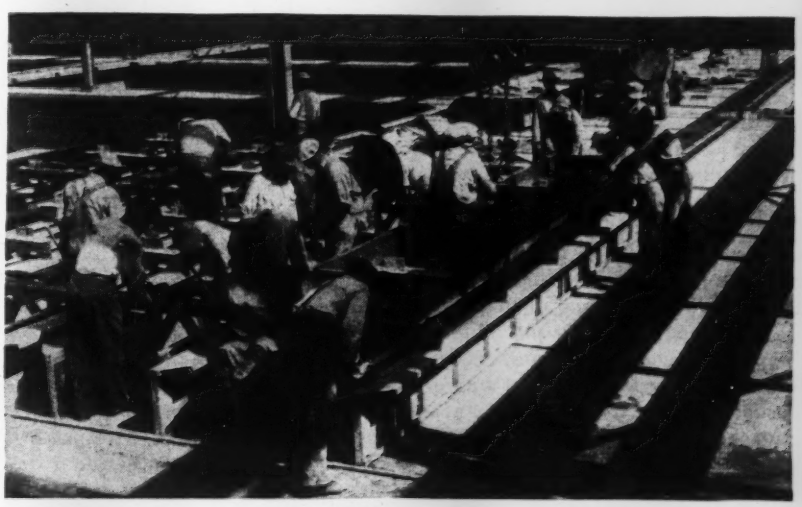


Fig. 5. Final step was to remove the steel forms, clean and oil them, ready for installation in the next filter basin.

Brazilian Concrete Building Design Compared with United States Practice

Arthur J. Boase
Manager, Structural Bureau, Portland Cement Association

***Contents in Brief**—Following his general comparison of United States and Brazilian building codes (ENR April 19, 1945, vol. p. 565), Mr. Boase analyses specific differences and their effect. He does this by using the American Concrete Institute Building Regulations to redesign a 16-story apartment building recently erected in Rio de Janeiro. Among other things, it is revealed that the A.C.I.-designed floor system of this building, requires about one-third more concrete and one-quarter more steel, and that A.C.I. columns are about 60 percent more costly. Information for this study was obtained by Mr. Boase on a recent tour of South American cities under the auspices of Engineering News-Record.*

IN A PREVIOUS ARTICLE there was given a rather complete review of the main design directives in the Brazilian building code. Attention was directed to the similarity between Brazilian regulations and many provisions of German practice, to the use of higher unit stresses in reinforcing steel, to the somewhat smaller loadings and in general to the broad concepts of reinforced concrete design as garnered from all European countries and incorporated with modifications into a bolder building code. Our South American neighbors have included provisions for design on an ultimate strength basis such as have been used in the Soviet Union for many years and they prepare for the future by making some general provision for prestressing concrete.

Irrespective of one's familiarity with building codes in general, a significant comparison is difficult to attain by a mere statement of the code, even though the reading of that code has been done studiously and a literal comparison made with known codes. "Bugs" will creep in, and most authorities are willing to delegate to posterity the privilege of writing the perfect building code. Probably the Brazilian engineers would be the first to admit that their code is not perfect, but none can say that it is not far-seeing. Certainly the Brazilian code is less restrictive than those under which North American engineers practice.

Too often codes are written and passed by the responsible legislative groups without actual designs of buildings having been made and detailed under the proposed provisions. It should be a rule that no code should become a law until such a trying out procedure has been followed. It is almost impossible to make quantitative comparisons between two codes without the benefit of a comparison of design procedures and of the resulting buildings. Often codes are adopted which give results contrary to expectations and in conflict with successful experience.

Brazilian building analyzed

In order to make a quantitative comparative study of the Brazilian code and the American Concrete Institute (A.C.I.) Building Regulations, the working drawings of an apartment building in Rio de Janeiro were secured. This building had been designed and erected under the provisions of the Brazilian building code previously reviewed (*ENR* April 19, 1945). The building in question was chosen for several reasons:

1. Competition on this building, according to the designing engineer, was "very fierce".

2. The building was high enough (16 stories) to give a reasonable number of stories to compare with similar American jobs.

3. The building was flanked on both sides in the narrow direction by similar jobs so that the designing engineer felt that wind calculations were unnecessary, thus eliminating at least one variable.

4. The designing engineer, Professor Antonio Alves de Noronha, is one of Brazil's most respected structural engineers. He has a well organized office, enjoys a large practice, is a professor at the national school of engineering in Rio de Janeiro, and is the author of many well known textbooks widely read and used in Brazil.

5. The job has been erected, is occupied and is giving satisfactory service.

The architect's room layout and, characteristically, the circular stairway, is shown in Fig. 1. I always was amazed to find this type of stairway, whether it was in an apartment building, office building or factory. On one occasion I had the experience of walking down 34 stories of an office building at that time under construction. I was accompanied by the architect, as well as his superintendent of construction. During the inspection, the architect and I carried on our conversation in English and I assumed that the superintendent understood not a word that we were saying. Finally, near the bottom floor and after noticing the intricate forms necessary for these circular stairways, I asked why they were always used.

The architect's reply was that he liked them and was used to designing them. I remarked that he would like the usual 90-degree bend type such as is common in the United States much better if he had to pay

carpenters $1.50 per hour and, much to my surprise, the superintendent, in perfect English, replied, "Sir, you are exactly right!"

A reproduction of the framing plan as actually built and traced from the Brazilian drawing is shown in Fig. 2. The Slab Reinforcement Table, converted to English units, shows the item, number, size of bars, number of bars, length of bars in inches, and total length of bars. This table always appears on the working drawings and the total weight of steel is figured. Remember, reinforcing steel costs ten cents per pound! The designer overlooks no opportunity to reduce the amount to be used.

No negative steel at perimeter

One point to be noted on Fig. 2 in regard to the steel layout is the absence of negative steel where the slabs join the beams and girders around the perimeter of the building. This fact was not noticed until I had returned to the States and I have no ready explanation. The bars listed are shown as straight bars and since the slab is so thin, bar bending as we know it is not likely. It is possible that these bars were lifted into the top of the slab after placing of the concrete and were "draped" toward the bottom of the slab in the area of positive moment. I saw this being done on other jobs.

It will be noted that the Brazilian design has many European characteristics. The spans generally are short and beams are placed directly under every partition so that the partition load is never supported on the thin slab.

All beams are so narrow that none of them project outside the partition. After plastering was finished, there was no evidence of the presence of any of the concrete structure except in kitchen and bath. The floor framing has numerous beams in odd relation to each other. In the United States the cost of forms for this type of framing would be high and American engineers would make their layouts to eliminate the extra forming required.

Design of floor system

The floor system used for the layout in Fig. 2 is a two-way solid concrete

PRINCIPAL POINTS OF DIFFERENCE IN UNITED STATES AND BRAZILIAN BUILDING CODES

- American practice, using intermediate grade steel, would require 26 percent more reinforcing steel in the floor system than does the Brazilian design, where structural grade was used. Under these conditions the American design uses slightly less reinforcing steel per cubic yard of concrete than does the Brazilian.
- Using the same strength of concrete, the American design requires 32 percent more concrete in the floor system than does the Brazilian design.
- For axial load on columns the Brazilian code allows 85 percent higher stress on concrete and 66 percent higher stress on steel.
- The American tied column has about twice as much concrete, and one and one-half times as much steel as does the Brazilian tied column. A comparison when bending in the columns is considered is still more in favor of the Brazilian type.
- Size of columns will change less frequently under the Brazilian code than it will under American practice, thus permitting large savings in formwork.
- American columns are approximately 60 percent more costly than are the Brazilian columns for 2,500-lb. concrete. American tied columns of 2,500-lb. concrete have approximately 80 percent more volume than have the Brazilian columns.

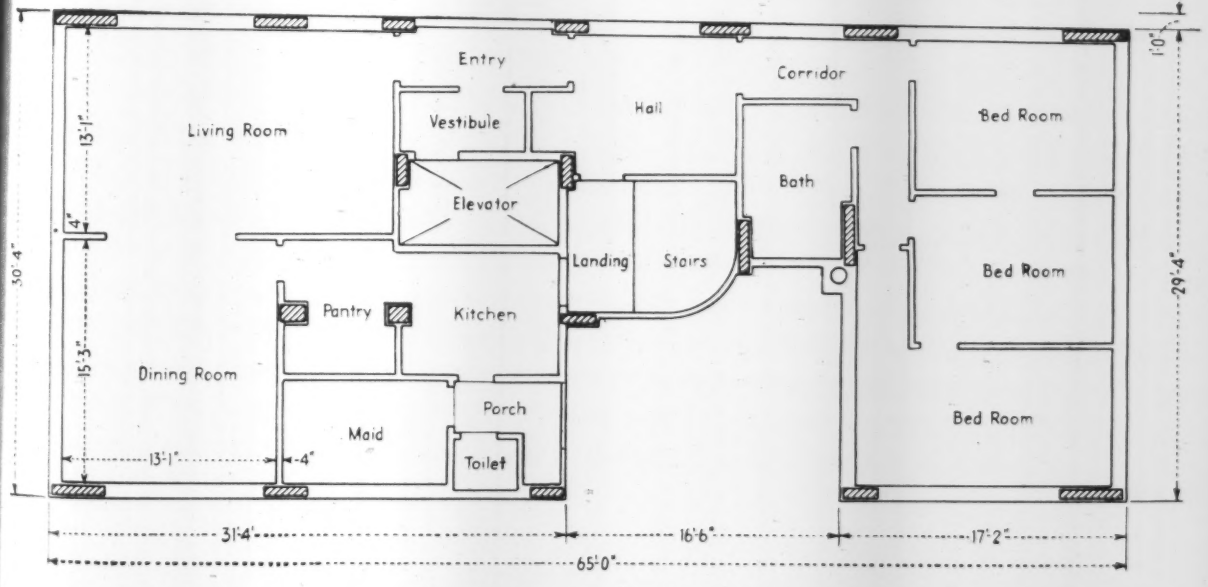


Fig. 1. Typical architectural plan for 16-story reinforced concrete apartment building in Rio de Janeiro, Brazil.

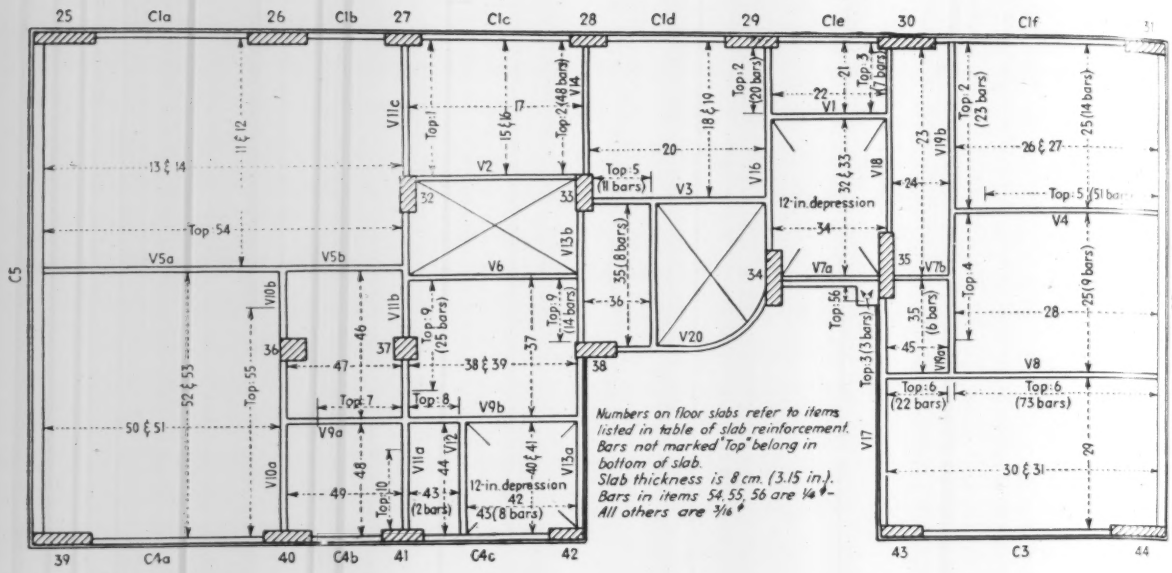


Fig. 2. Plan of typical floor system of apartment buildings as designed in Brazil and actually constructed. Extending 22.8 in. below floor level, beams are located directly under partitions and walls and are less than 4 in. wide.

slab with a thickness of 8 cm. (3.15 in.) reinforced with $\frac{3}{16}$-in. plain round bars having a protective concrete thickness of 1 cm. (0.39 in.) For comparison, A.C.I. standards require a minimum slab thickness of 4 in., reinforced with bars not less than $\frac{3}{8}$ in. in diameter, and a concrete protection of $\frac{3}{4}$ in.

All beams extend 58 cm. (22.8 in.) below floor level, and their width is either 8 or 10 cm. (3.15 or 3.93 in.), except for front and rear girders, which are 21 cm. (8.2 in.) wide. Compared with our standards these are extremely narrow webs, and relatively high shearing stresses should consequently be anticipated. The Brazilian code prescribes that a unit shear of $0.04f'_c$ is allowed on the concrete but if the computed stress exceeds $0.04f'_c$ reinforcement shall be provided for all the shear, under which circumstances a maximum value of $v/bjd = 0.10f'_c$ is allowed. The Brazilian designer of the building considered adhered to the European practice of using short, bent-up bars for diagonal tension and showed a view of each beam on the drawings with all bar bending details indicated.

It is characteristic of Brazilian designs that bars used for beam reinforcement are usually small. Consider for illustration the front and rear girders in Fig. 2, which have spans of nearly 30 ft. They are reinforced with sixteen ½-in. round bars, all but four of which are bent up to function as shear reinforcement. We would probably have substituted four 1-in. bars. In almost all beams the reinforcement is ⅜-in. round bars. The use of such small bars is entirely foreign to our custom and would hardly be advisable under conditions prevailing with American codes and working conditions. It should be remembered that all steel is cut and bent on the job by hand labor.

Reinforcing steel in Brazil is predominantly of structural grade, for which the allowable tensile stress is 1,500 kg./cm.² (21,300 psi.). For intermediate grade steel their allowable stress is 1,800 kg./cm.² (25,600 psi.), which is 28 per cent more than

SLAB REINFORCEMENT TABLE

Mark	Size	Number	Length	Total Length	Mark	Size	Number	Length	Total Length
1	3/16	48	4′ 11″	236′ 0″	29	3/16	9	17′ 1″	153′ 9″
2		91	3′ 7″	326′ 1″	30		26	6′ 3″	162′ 6″
3		10	2′ 5″	24′ 2″	31		31	9′ 6″	294′ 6″
4		10	4′ 3″	42′ 6″	32		17	7′ 1″	120′ 5″
5		62	3′ 7″	222′ 2″	33		14	5′ 3″	73′ 6″
6		95	3′ 3″	308′ 9″	34		11	9′ 6″	104′ 6″
7		4	3′ 0″	12′ 0″	35		14	4′ 3″	59′ 6″
8		13	3′ 0″	39′ 0″	36		3	8′ 10″	26′ 6″
9		39	3′ 0″	117′ 0″	37		13	10′ 4″	134′ 4″
10		8	3′ 0″	24′ 0″	38		8	6′ 3″	50′ 0″
11		16	21′ 2″	338′ 8″	39		11	8′ 2″	89′ 10″
12		11	14′ 1″	154′ 11″	40		10	7′ 3″	72′ 6″
13		43	9′ 10″	422′ 10″	41		7	5′ 3″	36′ 9″
14		60	14′ 1″	845′ 0″	42		5	5′ 7″	27′ 11″
15		12	10′ 8″	128′ 0″	43		10	7′ 5″	74′ 2″
16		9	6′ 1″	54′ 9″	44		7	3′ 5″	23′ 11″
17		12	8′ 6″	102′ 0″	45		3	6′ 6″	19′ 6″
18		11	10′ 6″	115′ 6″	46		8	7′ 3″	58′ 0″
19		8	6′ 10″	54′ 8″	47		6	8′ 11″	53′ 6″
20		15	10′ 2″	152′ 6″	48		7	7′ 3″	50′ 9″
21		4	7′ 1″	28′ 4″	49		6	7′ 5″	44′ 6″
22		6	4′ 11″	29′ 6″	50		14	11′ 0″	154′ 0″
23		14	3′ 11″	54′ 10″	51		19	16′ 3″	308′ 9″
24		3	14′ 1″	42′ 3″	52		30	14′ 1″	422′ 6″
25		23	12′ 11″	297′ 1″	53		21	9′ 2″	192′ 6″
26		12	6′ 9″	81′ 0″	54	1/4	123	4′ 11″	604′ 9″
27		17	10′ 6″	178′ 6″	55		66	4′ 11″	324′ 6″
28		24	10′ 0″	240′ 0″	56		7	3′ 11″	27′ 5″

allowed in the A.C.I. code. The difference becomes even more significant in view of the fact that Brazilians use plain bars. It is well known that tensile cracks tend to become much wider when the bars are plain than when they are deformed: so it is apparent that Brazilian engineers are not concerned about the supposedly harmful effect of wide tensile cracks.

Codes allow same bending stress

Extreme fibre stress in flexure for controlled concrete is $0.40f'_c$ in general, but $0.45f'_c$ for negative moment at supports. This is practically the same as in this country.

The design of this same typical floor is shown in Fig. 3 except that the building regulations of the American Concrete Institute of 1941 were used. A live load of 40 psf. was assumed. Under that code the slab will have a minimum thickness of 4 in.

In this particular layout some concession was made to the Brazilian ideas in that all interior beams were designed as 6 in. wide and 24 in. deep. It is seldom that I have seen a 6-in. beam used in this country, but it was thought advisable to keep this comparatively narrow width in order that not too great a difference would appear in the design and the quantities. Then, too, the 6-in. width would give a minimum projection of the beam into the room. Likewise, beams were placed under each partition.

The spandrel beams are 8 by 32 in. in front and rear walls and 8 by 24 in. in side walls. The framing has been somewhat simplified over that used by the Brazilian designers because it is believed that the cost of formwork would be too great in this country. The layout as shown in Fig. 3 adheres as closely to that of the Brazilian design, however, as was possible under our practice and to meet architectural requirements. In any instance and as is usual, the layout does not present the ideal textbook case for moment analysis, thus necessitating certain assumptions usually made in this country conforming as near to the code requirements for continuity and obtaining as accurate an analysis as possible.

After the design following the A.C.I. building regulations was completed, a take-off of quantities for both designs was made and the comparison is interesting:

A.C.I. BUILDING CODE DESIGN

	Steel	Concrete
Beams of typical floor	2039 lb.	353 cu.ft.
Slab of typical floor	1747 lb.	537 cu.ft.
Total	3786 lb. or 1.9 tons	890 cu.ft. or 33 cu.yd.

Steel per cu.yd. of concrete—115 lb.

ACTUAL BRAZILIAN DESIGN

	Steel	Concrete
Beams of typical floor	2166 lb.	248 cu.ft.
Slab of typical floor	863 lb.	424 cu.ft.
Total	3029 lb. or 1.51 tons	672 cu.ft. or 25 cu.yd.

Steel per cu.yd. of concrete—121 lb.

The A.C.I. design, therefore, requires 32 per cent more concrete and 26 per cent more steel in the floor system of this building. It should be recalled that a structural grade of steel was actually used and the redesign was figured for an intermediate grade.

Slender columns outstanding

At first glance the most impressive thing about the South American multistory buildings which I saw under construction was the extreme slenderness of the columns. While I had seen many photographs of South American jobs under construction and was greatly impressed by these rodlike members, it was not until I stood alongside of them that I fully appreciated the difference between columns here and there.

In my first article (*ENR* Oct. 19, 1944, vol. p. 499) I told of a 40-story building with three basements, all of reinforced concrete, under construction at Sao Paulo. Within the past month an engineer from Rio de Janeiro with whom I had become well acquainted on this trip visited me in Chicago and told me of the starting of a 50-story all reinforced concrete hotel building in his home city.

Tall reinforced concrete buildings abound in South American cities. No one who has visited the famous Copacabana Beach in Rio can fail to remember the impressive sight of row after row of tall buildings, which stretches for miles, and these are,

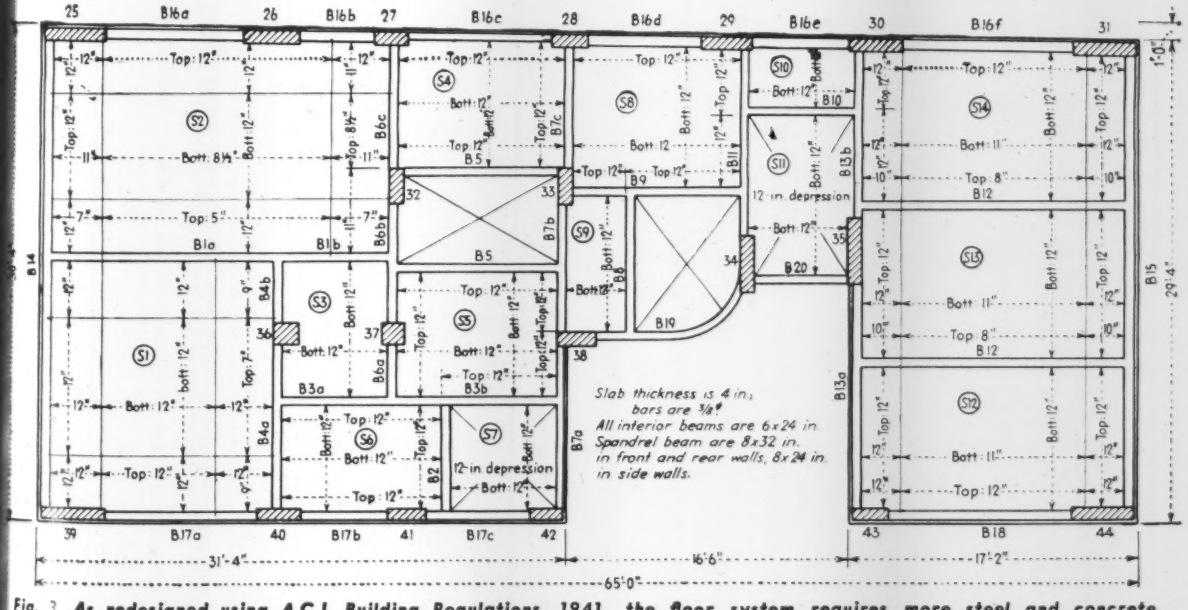

Slab thickness is 4 in.; bars are 3/8"
All interior beams are 6x24 in.
Spandrel beam are 8x32 in. in front and rear walls, 8x24 in. in side walls.
12-in. depression
31'-4"
16'-6"
17'-2"
65'-0"

Fig. 3. ***As redesigned using A.C.I. Building Regulations, 1941, the floor system requires more steel and concrete.***

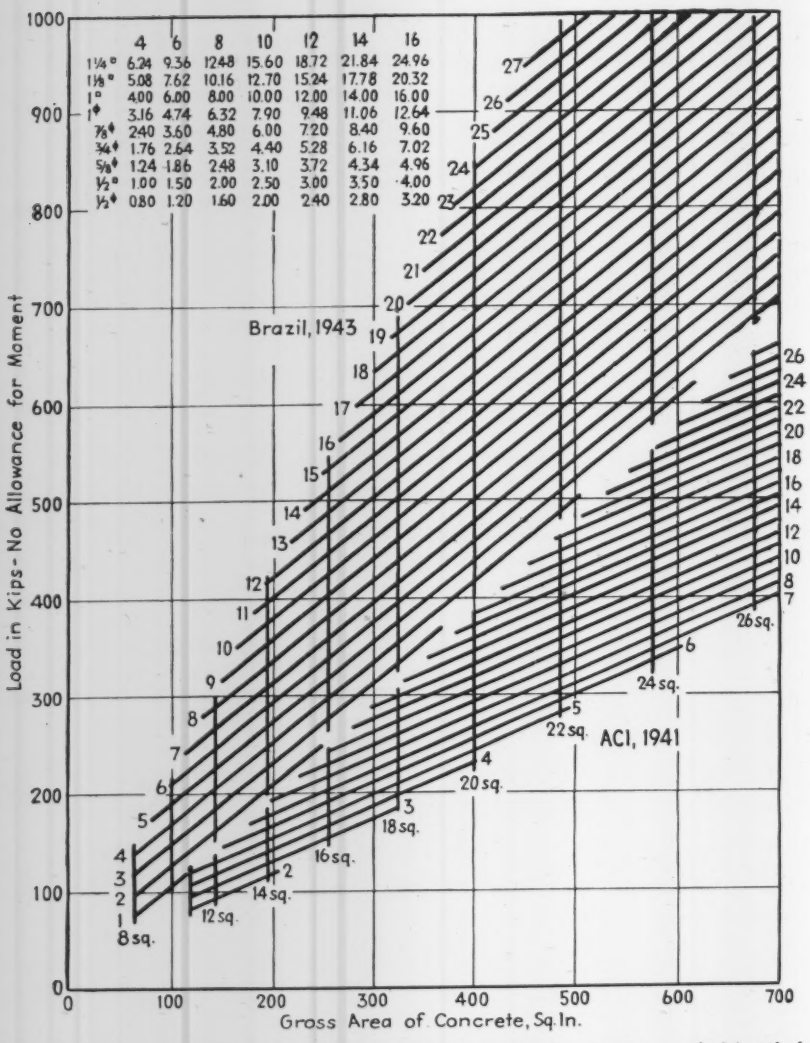


Fig. 4. When no allowance is made for moment, loads that can be carried by tied columns of 2,500-lb. concrete reinforced with intermediate grade steel are indicated for the Brazilian code and A.C.I. regulations.

without exception, all reinforced concrete. In regard to design and construction we are forced to admit that the Brazilian engineers and constructors have had more experience in tall buildings than have we, and their methods and procedures must be regarded with considerable respect.

I have been asked frequently if they had not had many failures. I did try to find an answer to that question. Admitting that proud people might be reluctant to advertise adversities, I must say that I found no evidence of such mishaps. It should be remembered that these engineers are responsible men. They have a reputation to maintain just as do engineers in other countries. If they did not have confidence in what they have done and are doing, it seems to me that they would not go ahead with buildings 40 and 50 stories high. Would they be willing to build these, the world's highest concrete structures, if failures had occurred? in reality, they have merely followed European practice somewhat liberalized.

Method of designing columns

The Brazilian column design procedure is illustrated in two design charts for tied columns, Fig. 4 and 5, which are prepared for a 28-day concrete strength of 2500 psi. and intermediate grade steel. For comparison, data for tied columns designed according to the A.C.I. code, 1941, are also incorporated in these charts. The basic design formulas apply[illegible] to Fig. 4 are:

Brazil, 1943: $P = 0.833A_c + 21A_s$
A.C.I., 1941: $P = 0.450A_c + 12.8A_s$

in which P is load-carrying capacity in kips, A_c is gross area of concrete and A_s is area of longitudinal steel.

For axial load the Brazilian code allows 85 percent higher stress on concrete and 66 percent higher stress on steel. In addition, the maximum steel percentage in that code is 6 as compared with 4 in the A.C.I. code, but the full significance of the formulas is realized best by inspection of Fig. 4.

For illustration, consider a column with an axial load of 650 kips and follow the horizontal line for 650 kips in Fig. 4 to the point of intersection with the heavy vertical line marked 18 sq., at which point the area of steel is seen to be 17.8 sq. in. The column size is 18x18 in., and the vertical reinforcement is fourteen 1¼-in. sq. bars. It is also seen from Fig. 4 that the smallest size that can be used for 650 kips designed according to the A.C.I. code is 26x26 in. reinforced with 27.0 sq.in. of vertical steel. The A.C.I. column has 2.1 times as much concrete and 1.5 times as much steel area as has the Brazilian column.

Another striking feature illustrated in Fig. 4 is that an 18-in. square column can carry a maximum load of 310 kips according to the A.C.I. code but 690 kips according to the Brazilian code. Contemplating these figures one is tempted to say "there is no comparison." But the Brazilian code is even more liberal when bending moment is incorporated in the column design, as will be illustrated in connection with Fig. 5.

Allowance for moment in columns

Both codes discussed specify that provision shall be made in the design of practically all columns in this building for moments transmitted to them from floor slabs and beams. According to Equation 28 in Section 1109 of the A.C.I. code, 1941, allowance may be made for a bending moment, M, by substituting an equivalent axial load of CDM/t. The value of $m = CD$ is approximately 3 for tied columns, and t is the depth of the cross-sectional area of the column. This results in a convenient procedure

since the designer simply adds to the axial load the quantity mM/t and then designs a column for the total load considered concentrically applied.

When allowance is included for bending moment, the Brazilian code permits an increase in fiber stresses amounting to 20 percent for both concrete and steel. In other words, if the quantity of mM/t does not exceed 20 per cent of the actual axial load, the bending moment, M, may be ignored. Nothing similar is permitted in the A.C.I. code. The basic design formulas applying to Fig. 5 are:

Brazil, 1943: $P = 1.000A_g + 25.6A_s$.
A.C.I., 1941: $P = 0.450A_g + 12.8A_s$.

If, for illustration, the total load including allowance for bending moment is 650 kips, of which at least one-sixth is due to bending moment, Fig. 5 applies and the minimum square column sizes are 16 in. (Brazil) and 26 in. (A.C.I.), the ratio of concrete area being $(26/16)^2 = 2.64$. The steel areas for these columns are 15.4 (Brazil) and 27.0 (A.C.I.) with a ratio of 27.0/15.4 = 1.75. For another illustration, an 18-in. square column can support a combined load of 310 kips according to the A.C.I. code, but the top load is 825 kips according to the Brazilian code. The load ratio in this instance is 2.66.

Consider another example in connection with Fig. 4 and 5. A 20-in. Brazilian column with 24.0 sq.in. of steel can carry 845 kips of concentric load plus 20 percent, or 170 kips of equivalent load for moment allowance. Under similar circumstances an A.C.I. column would have to be 33 in. square with 43.3 sq.in. of steel. These figures are, to me, truly astonishing. Yet Brazilian engineers do not feel that they are doing anything daring. After all, substantially the same requirements are incorporated in the German code, 1932, although in some respects the Brazilian code is more liberal.

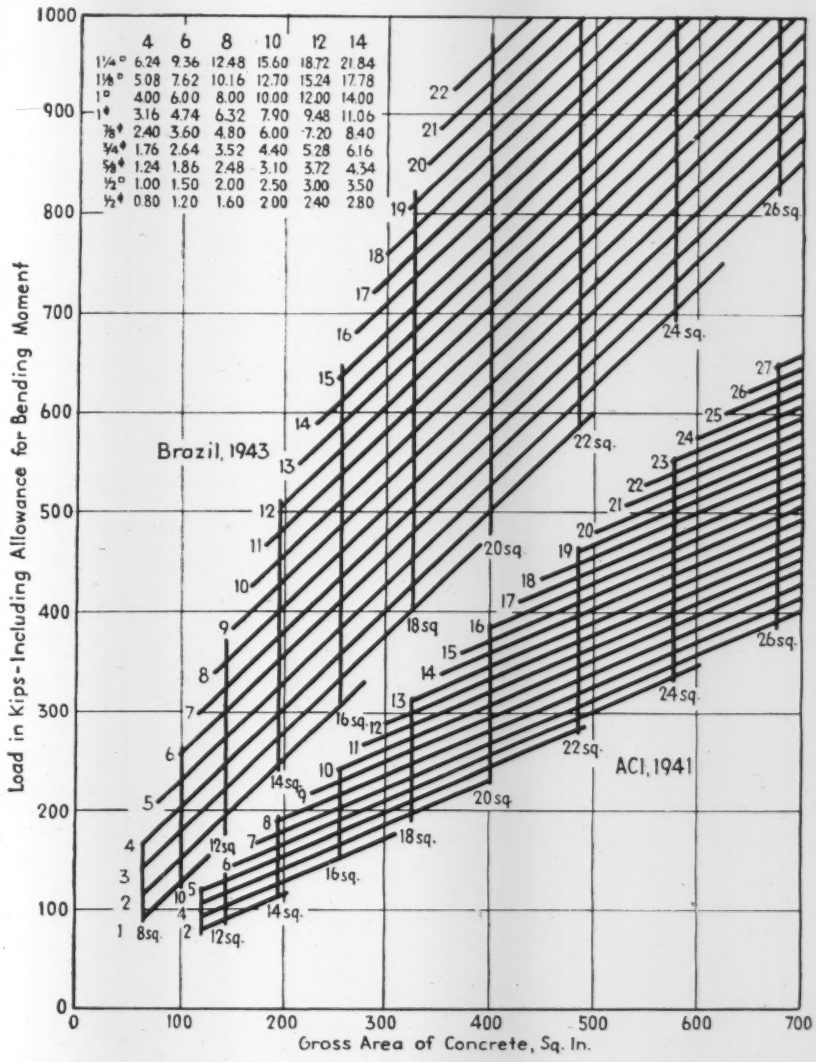


Fig. 5. When allowance is made for moment, loads that can be carried by tied columns of 2,500-lb. concrete reinforced with intermediate grade steel are much greater for Brazilian columns than for columns designed under the A.C.I. code. Compare with Fig. 4.

Low strength concrete used

They have one important limitation in the Brazilian code in that they do not recognize concrete strengths in excess of 2,670 psi. for building construction. Brazilian cement does not develop as high a strength as ours. With the method of design as used in Brazil a low upper limit on the strength of concrete is probably a wise provision. Also, there is no appreciable gain in using spirals, as will be demonstrated later. Unless forced to by space requirements, Brazilian engineers use as little steel as possible in their columns, the minimum ratio allowed being 0.008 for vertical steel.

A saving worth mentioning may be illustrated by reference to Fig. 4. Consider a column stack with a load of 400 kips in the bottom column. Using the A.C.I. column design chart in Fig. 4 shows that the column size will be 22 in. square in the lower stories, 18 in. square in the middle stories, and 14 in. square in the top stories. This means that the bottom story forms must be cut down twice in size for use in the upper stories and that beam forms must be extended twice to make them long enough to fit between columns. According to the Brazilian code, a 14-in. square column size may be used for all stories, and this will result in a considerable reduction in labor cost for forms for both columns and beams.

The minimum column size is 8x8 in. in the Brazil code but it is 10x12 in. in the A.C.I. code. The difference may seem immaterial but may occasionally be quite important, especially in the design of building frames for occupancies such as hospitals, apart-

ments and offices. In walls consisting of 4-in. facing material plus 8-in. masonry back-up a column with a minimum dimension of 8 in. can be concealed within the masonry back-up and interior wall surfaces can then be made smooth. On the other hand, a 10-in. column will project beyond the face of the wall, and this is often undesirable as well as uneconomical.

One of the main reasons for the 10-in. minimum dimension is probably that the 1½-in. protection required by the A.C.I. code would crowd the vertical bars pretty close together in an 8-in. column. For typical indoor conditions, the Brazilian code calls for ⅝-in. protection, which is close to the standard requirements in practically all European and South American codes. Section 507 (b) in the A.C.I. code, 1941, says in part that the protective covering "shall be not less than ¾ in. for slabs and walls, and not less than 1½ in. for beams, girders and columns." The inference, as I see it, is that the 1½-in. protection applies to members with exposed corners but not necessarily to members that are built flush with surrounding masonry. It seems to be consistent, then, to allow ¾-in. protection for columns in walls provided no part of the column projects beyond the face of the wall. At the same time, the minimum dimension for columns so concealed should be reduced to 8 in.

Referring to the typical floor shown in Fig. 2, all exterior columns are 8 in. wide, the walls are of 8-in. hollow masonry which is set flush with the columns and then plastered both inside and outside, the result being that all wall columns are completely concealed. Fig. 3 is a typical floor framing plan which, with a few minor changes, corresponds closely to the original Brazilian layout but which is designed in accordance with the A.C.I. code.

Column loads computed

The loads were run down in all the columns and compared with the actual carrying capacities of the columns computed on the basis of the Brazilian code. The loads compared reasonably well, showing that there is but little difference in the way in which loads are computed in the two countries.

The loads on the four corner columns, which were the largest in the whole building, were selected for a detailed study. The stack of columns 16 stories high was first designed six different ways for axial loads only. All columns were square except the minimum A.C.I. columns, which were 10 x 12 in. Intermediate grade steel and hot rolled spirals were used throughout, and all story heights were taken as 10 ft. The six designs were as follows:

Brazil, 1943: $f'_c = 2{,}500$ psi., steel and spiral;
A.C.I., 1941: $f'_c = 2{,}500$ psi., steel and spiral;
A.C.I., 1941: $f'_c = 5{,}000$ psi., steel and spiral.

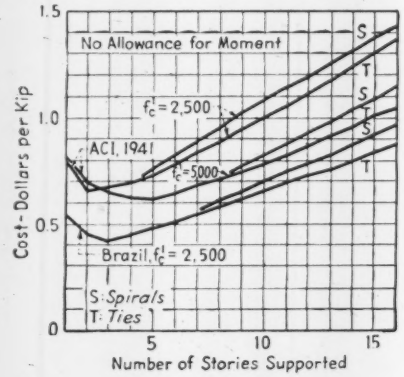


Fig. 6. In this chart the cost of a column stack in dollars per kip of load in the column at the bottom of the stack is given for various numbers of stories, when no allowance is made for moment.

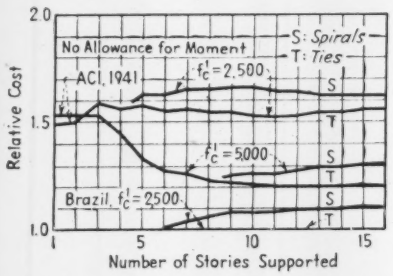


Fig. 7. Taking the cost of Brazilian tied columns as unity, the costs given in Fig. 6 are replotted in this chart. For 2,500-lb. concrete, A.C.I. columns cost approximately 60 percent more than Brazilian columns. Even 5,000-lb. concrete A.C.I. columns are more than 20 percent more costly.

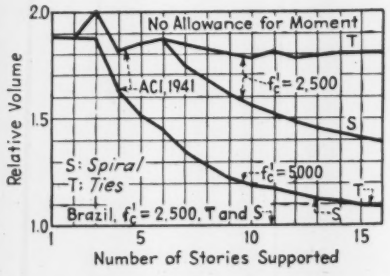


Fig. 8. When quantities are compared (Brazilian columns taken as unity), the 2,500 lb. concrete A.C.I. tied columns are approximately 80 percent larger than Brazilian columns, when no allowance is made for moment.

The designs as outlined were made for the following axial loads, in kips, beginning with the top story: 18, 44, 70, 96, 122, 149, 175, 202, 229, 257, 286, 315, 344, 373, 401, 430. With the exception of the Brazilian columns with spirals, the columns were subsequently designed for the axial loads given above plus the value of mM = 75 kips, this being considered a reasonable allowance for bending moment in conformance with the discussion above on this subject.

Unit costs assumed

Eleven designs in all were made, quantities were taken off, and estimates were prepared on basis of the following costs in dollars per unit:

Concrete, 2,500 lb.	$0.35 per cu.ft.
Concrete, 5,000 lb.	$0.40 per cu.ft.
Bars	$0.05 per lb.
Ties and spirals	$0.06 per lb.
Forms	$0.25 per sq.ft.

Costs were added in such a manner that total cost was obtained for any number of stories from 1 to 16, so that the trend could be ascertained. In order to make the cost data more generally applicable, each cost figure was divided by the number of kips constituting the load in the column at the bottom of the stack considered: that is, the cost of a 16-story stack was divided by 430, the cost of a 15-story stack was divided by 401, etc. Ratios of costs and ratios of concrete volumes were also computed, and all the data obtained were used for plotting of the curves in Fig. 6 to 11.

Costs for six groups of columns designed for axial load only are shown in Fig. 6, the cost being in dollars per kip of load in the column at bottom of stack. For illustration, Brazilian tied columns in a six-story stack cost $0.50 per kip, and if the load in the bottom story column is, say, 180 kips, the entire six-story column stack will cost 0.50x180 = $90, when all stories are 10 ft. high.

The cost per kip is seen to be relatively high for a one-story column

and decreases to a minimum at between two and five stories, after which the increase is practically linear. Spiral columns cost more than tied columns, which indicates that spirals should be used only where dictated by space requirements. For the Brazilian columns in Fig. 6 there is no advantage in using spirals, either as to cost or size, and the disadvantage will be even more pronounced for cases with bending moment included because the shell is disregarded in Brazilian spiral columns.

Relative costs of columns

A clearer picture of relative costs is obtained by inspection of Fig. 7, in which the Brazilian column cost is taken equal to unity for all numbers of stories. It is seen that the 2,500-lb. A.C.I. columns are approximately 60 per cent more costly than the Brazilian columns and that the cost ratio is practically constant for all numbers of stories.

By increasing the concrete strength to, say, 5,000 psi. the cost of A.C.I. columns might be reduced approximately to the level of the Brazilian columns. Results of the study in connection with such a change in concrete strength is shown in Fig. 7. The 5,000-lb. A.C.I. column costs exceed those of the Brazilian columns by 50 percent for a few stories, and the excess decreases until it becomes practically constant for numbers of stories greater than 12, at which point it amounts to 20 percent for A.C.I. tied columns and 30 percent for A.C.I. spiral columns. This is surprising in view of the fact that the allowable concrete stresses are 900 psi. for the 5,000-lb. A.C.I. columns but only 833 for the 2,500-lb. Brazilian columns. The cost difference, therefore, must represent the effect of the allowable steel stresses, which are 12,800 psi. in the A.C.I. code but 21,300 psi. in the Brazilian code.

Relative quantities for columns

The relative volumes of concrete required for the designs in Fig. 6 are given in Fig. 8, the volume of the Brazilian columns being taken as unity. The tied A.C.I. columns with 2,500-lb. strength have approximately 80 percent more volume than have the Brazilian columns. Where spirals are substituted for ties, the excess volume of the 2,500-lb. A.C.I. columns varies from 87 percent at six stories to 39 percent at 16 stories. For the 5,000-lb. A.C.I. columns, the volume, which is the same for both spirals and ties, is relatively high for a few stories but

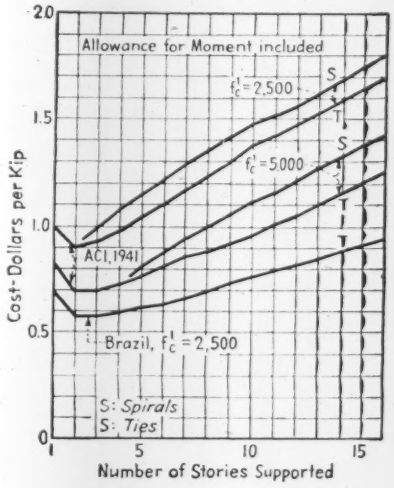


Fig. 9. Similar to Fig. 6, this chart gives the cost of a column stack in dollars per kip of load in the column at the bottom of the stack, when allowance for moment is included.

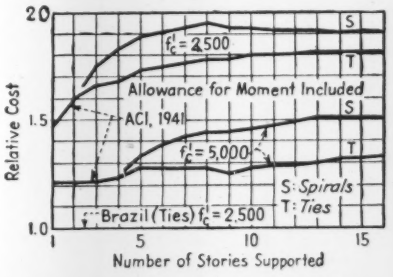


Fig. 10. Similar to Fig. 7, this chart gives the relative costs, Brazilian tied columns taken as unity, when allowance for moment is included. For 2,500-lb. concrete, A.C.I. columns cost up to 95 percent more.

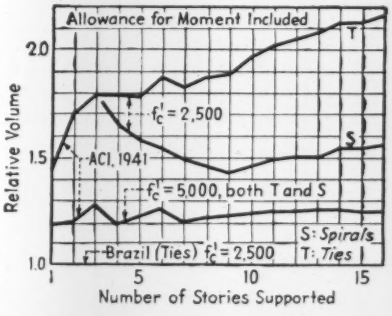


Fig. 11. Similar to Fig. 8, this chart compares relative quantities, Brazilian columns taken as unity, when allowance is made for moment. A.C.I. columns require up to 115 percent more concrete than the former.

approaches that of the Brazilian columns as the number of columns increases.

A comparison of columns designed for axial load plus a reasonable allowance for bending moment as previously discussed is presented in Fig. 9, which gives the computed cost in dollars per kip, and in Fig. 10, which represents the costs in Fig. 9 given in relation to the Brazilian columns, the cost of which is taken as unity in Fig. 10. For ten or more stories, the cost ratios are essentially constant, the excess of the A.C.I. over the Brazilian columns amounting to approximately 90, 80, 50 and 30 percent for the various types of design as illustrated in Fig. 10. These percentages are considerably greater than in Fig. 7, the reason being that the Brazilian code allows 20 percent higher stresses in both concrete and steel when bending moment is included, whereas the A.C.I. code allows no increase. Under these circumstances 2,500-lb. A.C.I. columns cost almost twice as much as Brazilian columns.

The variation of relative concrete volumes when allowance is included for a reasonable amount of bending moment is illustrated in Fig. 11. The comparison is particularly unfavorable to the tied 2,500-lb. A.C.I. columns, the volume of which for 16-story columns is considerably more than twice the volume of the Brazilian columns.

The unit costs used in the studies so far have been representative of what is believed to be normal conditions in this country. In Brazil, by comparison, material costs are higher and labor costs are lower. By applying the cost figures given in my first article I arrived at the following costs, which are believed to be fairly reasonable figures for average Brazilian conditions. Concrete: $0.35 per cu. ft.; forms: $0.15 per sq. ft.; and reinforcement: $0.115 per lb. Compared with our own costs, forms are much lower and reinforcement is much higher, while concrete cost is about the same in both countries.

For Brazilian columns designed for axial load only, a comparison between the North and South American costs is given in Fig. 12. There is no appreciable difference up to six stories, but for more than six stories, the columns cost considerably more in Brazil than the same columns would

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Relative costs of columns

A clearer picture of relative costs is obtained by inspection of Fig. 7, in which the Brazilian column cost is taken equal to unity for all numbers of stories. It is seen that the 2,500-lb. A.C.I. columns are approximately 60 per cent more costly than the Brazilian columns and that the cost ratio is practically constant for all numbers of stories.

By increasing the concrete strength to, say, 5,000 psi. the cost of A.C.I. columns might be reduced approximately to the level of the Brazilian columns. Results of the study in connection with such a change in concrete strength is shown in Fig. 7. The 5,000-lb. A.C.I. column costs exceed those of the Brazilian columns by 50

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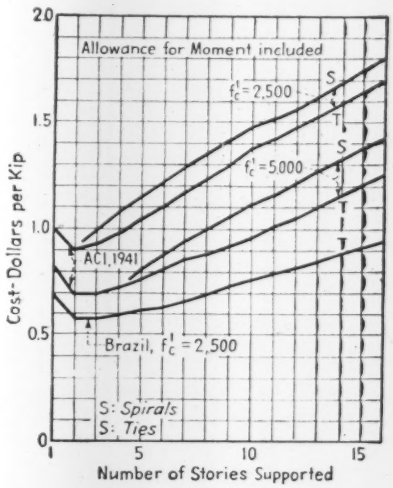

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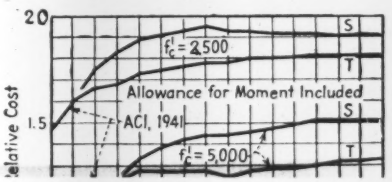

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cost here, and it is seen that in Brazil spirals are more uneconomical than they are in this country. The curves indicate the reason why Brazilian engineers use as little steel as possible.

Provision for field inspection

With respect to bending moments in columns, the Brazilian code has a special provision that is even more liberal than anything discussed so far. For axial load the allowable concrete stress is $0.333f'_c$ but must not exceed 850 psi. For combined bending and axial load the extreme fiber stress may be increased to $0.400f'_c$ but must not exceed 1,070 psi. These are the stresses underlying the studies made and illustrated in the charts. But under certain circumstances the extreme fiber stress for combined bending and axial load may be increased from 1,070 to 1,560 psi. for a concrete strength of $1,070/0.40 = 2,670$ lb. This extreme fiber stress of $0.58f'_c$ is permitted ". . . when the inspector carefully verifies that all the provisions of the code have been adhered to, when the calculations include all forces and effects to which the structure is subjected, and when necessary precautions have been taken to guarantee a proper strength of the concrete."

Advantage has not been taken of the stress of $0.58f'_c$ allowed by the special clause, which would have shown an even greater disparity between the two codes. A numerical example illustrates the application of this higher stress. Consider an 18-in. square column with twelve 1¼-in. sq. bars, which is permitted by the Brazilian code to carry an axial load of $0.850 \times 324 + 21.3 \times 18.72 = 675$ kips. If $f'_c = 2,670$ psi., the same column has a maximum capacity for combined bending and axial load equal to $1.560 \times 324 + 25.6 \times 18.72 = 985$ kips, which is an increase of 46 percent. In other words, if the equivalent axial load representing the bending moment does not exceed 46 percent of the actual axial load, the bending moment may be ignored. In reality, this indicates that the Brazilian code allows designers to disregard a very large proportion of all bending moments in building columns.

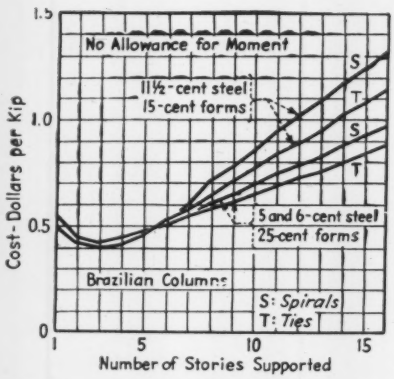


Fig. 12. Costs of columns in the two countries are compared in terms of dollars per kip of load in the column at the bottom of the stack, when no allowance is made for moment. The upper group of two curves represents Brazilian unit costs. The lower curves average costs in the United States. Cost of concrete is taken as 35 cents per cu. ft.

Comparable buildings in U. S.

The above discussion presents much thought provoking data as well as a challenge as to the correctness of our design assumptions. There are buildings in the United States constructed at about the beginning of this century that are almost as slender as are now being erected in South American countries today. These old buildings have, in general, performed satisfactorily where the designing was on a rational basis and where the detailing was carefully done. They were designed before we had building codes, and most of the work was done by engineers who had come from Europe. It was not long before building codes on reinforced concrete came into being. The writers of these codes were more conservative than their European brothers and the codes required higher factors of safety. Then materials began to improve, as did workmanship and design procedures, without a comparable relaxing of restrictive measures. No one would expect American engineers, with our labor and material costs, to go as far as some of these South American engineers, but it does seem that a restudy of our codes might indicate that a middle course could be followed safely and to the advantage of the consuming public.

Sidewalk Sub-Spaces in Toledo Under Rigid City Control

Since Feb. 25, 1944, when a sidewalk in downtown Toledo, Ohio, suddenly collapsed, killing one girl and injuring her three companions, the city engineering division has inspected approximately 500 subterranean areas undermining the city's sidewalks, according to Clayton L. Piper, city engineer. Following the accident, the city council promptly enacted an ordinance regulating the use of sub-space by property owners, revoking all permits previously issued and providing for rigid inspection of underground areas.

The inspections took place mostly in the downtown area and resulted in a total of 54 places being granted certificates of compliance. Considerable work is under contract, and only about 50 areas of those inspected are considered unsafe. Persons owning property where subterranean cavities exist must apply to the city engineering office for a permit to use the space. Inspection work is done by the city engineering division's field engineers, who check underground rooms for structural defects, weakened beams, and other hazards.

When an inspection is made, a detailed sketch of the sub-space is prepared. If entirely safe, the owner is given a certificate of compliance. If unsafe, the user is notified by registered mail that he must hire a contractor, submit a sketch of the recommended changes for city approval, and then have the work done. The city also has the power to order the required changes and assess the cost against the property.

When a permit is issued, the user of the subterranean area agrees to maintain the space in a safe condition, provides a public liability policy or bond which co-insures the city against damages, and pays an inspection fee. City engineers prefer, however, that the space be filled rather than continued in use. Fines up to $300 are provided for failure of users to comply with the ordinance.

Interpretation of Bid Data Held Responsibility of Bidder

The Massachusetts Supreme Judicial Court, in an appealed case involving presentation of subsurface data on contract construction, ruled recently that the information was given for the contractor's interpretation and, in absence of fraud, could not form the basis for recovery of greater costs, allegedly sustained. The case grew out of the construction of the Quabbin Dike of the Boston water supply system. (*ENR* June 18, 1936, p. 882.)

The contractor, Arthur A. Johnson Corp., of New York City, contended that the Metropolitan District Water Supply Commission concealed information in its possession as to the nature of the subsoil in certain borrow pits from which the material was to be obtained for the construction of the embankment. Originally, the case was referred to an auditor, whose findings of fact were not expected to be final and who found for the contractor in the sum of $285,000. After examining additional material and witnesses, a superior court took the opposite view and disallowed payment.

Disclaimer clauses in contract

Information furnished bidders stated that material for constructing the embankment were available on lands of the commonwealth in the vicinity of the work but that each bidder must inspect these areas carefully to form his own opinion as to the amounts and character of the materials likely to be encountered and the conditions affecting their excavation, transportation and disposition. Borings and test pits were made with reasonable care. Two rather extensive shovel cuts were made in borrow pits to expose the material that could be expected to be encountered; testimony later showed that the material thus exposed was almost identical with that throughout the borrow pit.

Records of bore holes, test pits, shovel cuts, samples of materials taken from them and laboratory analysis of them could be seen at offices of the commission. The specifications contained the rather familiar clause, "There is, however, no expressed or implied guarantee as to the accuracy of such borings, test pits, shovel cuts, sluicing tests, laboratory analyses or studies, or records or of interpretations of them."

Hardpan or mixed materials

On the first boring made the inspectors recorded that "hardpan" had been found in the hole. All of the boring records, except those of this first hole, used the term "mixed material." The boring plans that were furnished to the contractor classified the materials taken from the bore hole as muck or peat, loam, boulders and rocks, and also divided the material into nine classes: (1) gravel, uniform; (2) coarse sand, uniform; (3) coarse sand, variable; (4) medium sand, uniform; (5) medium sand, variable; (6) fine sand, uniform; (7) fine sand, variable; (8) rock flour or silt, uniform; and (9) rock flour or silt, variable. Mixed materials were stated in general to consist of class 7 or class 9.

The contention of the contractor was that the boring plans represented that the borrow area was composed of rock flour, sand and gravel, materials that could be easily excavated—but that the area contained a large amount of hardpan as the commission knew but did not disclose to the contractor.

Prior to making the bid the contractor's chief engineer and other experienced employees visited the site, were informed that there was difficulty in excavating the test pit because of the presence of boulders and were shown the records of the borings and were given the amount of dynamite used in drilling certain holes.

Court upholds engineers

The superior court held that the words "mixed materials" were undoubtedly the correct geological description of masses of different materials mixed together in compact formation commonly found in glacial deposits like the borrow area in question. This is what the contractor contended should have been described as hardpan. It appeared in the evidence that as a rule the pressence of rock flour indicated a cemented material in the glacial country involved.

The court found that the information given was a true and accurate portrayal of the area concerned and that the difficulty experienced in excavating the material was due to the presence of boulders in the glacial till, not to the fact that the term hardpan did not appear on the plans. The Supreme Judicial Court upheld the lower court.

Mexico Plans Expansion of Power Facilities

Mexico will increase its power facilities 45 percent during 1945-46 by spending $20,000,000 (100,000,000 pesos) on an electrification program, reports Mexico City's *El Universal*. Increased electrical energy production is one of the basic necessities for Mexico's many expanding industries.

Under the direction of the Comision Federal de Electricidad, the 1945-46 program calls for increasing electric power output by 190,000 hp., states the newspaper, which lists new electric plant construction as follows: In Torreon, with 40,000 hp. to serve the Laguna District; in Tomata, Veracruz, with 15,000 hp.; in Minas, Veracruz, with 10,000 hp.; in Tonilita, Colima, with 7,000 hp.; and the city of Veracruz with 15,000 hp.

Additional power from Ixtapantongo

In addition there will be completed the second unit of the hydroelectric project of Ixtapantongo, with 40,000 hp., which with present production will be sufficient to supply electric energy not only to the Federal District but also to adjacent areas.

The 1945-46 plan also envisages the furnishing of electrical service to approximately twenty important cities of the country, and the improvement of electrical services of Oaxaca, Mexicali, Monclova, Jimenez, and others. Approximately seventy towns, which at present have insufficient or no service, wil be furnished with electricity. Transmission lines will be installed from the Colotlipa plant in the State of Guerrero to furnish ample electric power to both Chilpancingo and Acapulco.

New Jersey Ship Canal Model Tests Prove Salinity Can Be Controlled

***Editor's Note**—One of the biggest postwar projects proposed for the East is the building of a 33-mile ship canal across New Jersey connecting the Delaware and Raritan rivers. The project has stirred up considerable controversy as to its economy and desirability. Chief objection, however, comes from local interests fearing intrusion of salt water from Raritan Bay into the canal with resulting pollution of water supplies. These objections led the Corps of Engineers to conduct thorough model tests on the proposed locks to determine methods of operation and salinity control at the Vicksburg Waterways Experiment Station. The test results show the proposed design and operation of the project will hold the salinity in the canal within satisfactory limits.*

To PROVIDE an inland ship channel from New York Harbor to Delaware and Chesapeake bays, the Army Engineers have proposed a 33-mile ship canal across New Jersey from Sayreville at the head of Raritan Bay to Bordentown on the Delaware River below Trenton. In accordance with a report of the Chief of Engineers submitted July 14, 1942, bills were introduced in Congress early in 1943 to authorize construction of this project. Public hearings held by the House Committee on Rivers and Harbors in March, 1943, revealed strenuous objections to the waterway principally because of possible intrusion of salt water from Raritan Bay through the canal and Delaware River into local municipal water supplies. Particular concern was expressed by owners of wells in the sandy soil areas of New Jersey.

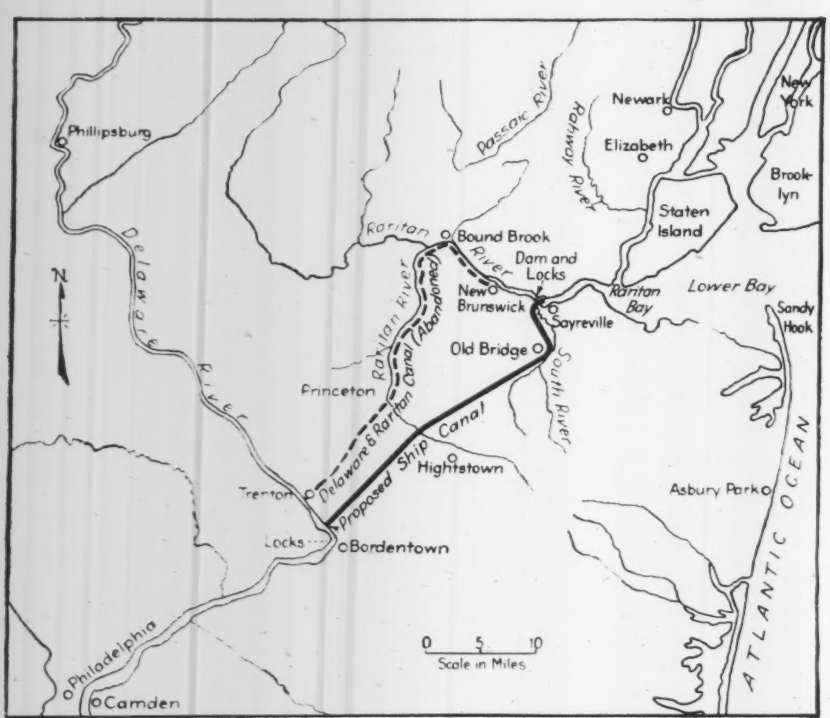


Fig. 1. Construction of a ship canal from the Delaware River near Bordentown to tidewater on the Raritan River in the New York Harbor area is proposed. The canal also would form a link in the sheltered barge route along the Atlantic Coast.

Though previous studies had convinced the Army Engineers that salinity could be controlled by proper design of the project and careful management and operation, in view of the objections at the hearing they decided to conduct further investigations. Therefore, an experimental project was set up at the Waterways Experiment Station at Vicksburg, Miss. These experiments have now been concluded, and the results are regarded as very satisfactory.

The tests were witnessed in April by a group from New Jersey and Pennsylvania, including representatives of the principal objectors, the North Jersey District Water Supply Commission, the New Jersey State Water Policy Commission, the Interstate Commission on the Delaware River Basin, the Department of Public Works of Philadelphia, the Sanitary Water Board of Pennsylvania, and the Duhernal Water System, a private water company.

Project design

An outline of the proposed project will give a better understanding of the nature and scope of the experiments at Vicksburg. The proposed canal would have a bottom width of 250 ft., and a normal depth of 35 ft. to allow for a 28-ft. depth under a 5-ft. drawdown for vessels of 25 ft. draft. Canal and pool levels would be maintained at 10 ft. above mean low water by dams and three locks at each end. Salinity control would be at the Raritan River end, where the three locks, barge, ship and yacht chambers placed side by side would be specially designed for

moval of salt water getting into that end of the canal. A dam at the Raritan locks would raise the level of the Raritan River approximately 10 ft. above mean low water.

Water from the Delaware

Water for operation of the locks would be supplied by diversion from the Delaware River by pumping and by natural inflow from the Raritan River and other tributary streams. The quantity of water to be diverted from the Delaware River would be supplied by a proposed storage reservoir in the Delaware River Basin. The pumped diversion would create a current in the canal from the Delaware end, which would aid in preventing salt water from advancing in the canal and in flushing any salt water out of the Raritan end. As the low water flow in the Delaware is 1,400 cfs., the proposed diversion is held by the Army Engineers to be not serious. Then, too, they find a precedent for diverting 200 cfs. from the Delaware in like deversions made to operate the old Deleware & Raritan Canal during its period of maximum activity.

At Sayreville on the Raritan River the proposed locks consist of one ship and one barge lock, each 90x960 ft., with floors 35 and 22 ft. below mean low water, respectively. An innovation in lock design is two sets of intermediate gates providing usable chamber 270, 350, 450, 530 and 880 ft. long. Use of the minimum length chamber for each particular vessel locking through will conserve water necessary to operate the locks. Alongside the two big locks is a third smaller unit for yachts, 30x150 ft., with one set of intermediate gates dividing the lock into two equal chambers and providing usable lengths of 65 ft. and 130 ft. Floor level of this lock would be 12 ft. below mean low water.

Salinity control

Only the locks at Sayreville end will be equipped for salinity control, as the water of the Delaware River is fresh at Bordentown lock site. The locks will be fitted with filling ports set high along the sides and discharge ports in the floor. The lock channels will merge into a lined approach between two guide walls at the pool or upper end, built with a concrete floor sloping downward away from the locks to form a deep sump and salt water trap between guide walls at 50 ft. below mean low water level. Conduits for filling and flushing locks will have their intakes in this sump. Thus, the heavier salt water getting into the upper pool will settle largely in the sump and be taken back through the locks to the lower pool. Provision is also made for "scavenging" in the upper pool outside of the bottom of the sump guide walls by a constant discharge of 25 cfs. from the sump (60 ft. below mean low water) to the lower pool through a deep conduit.

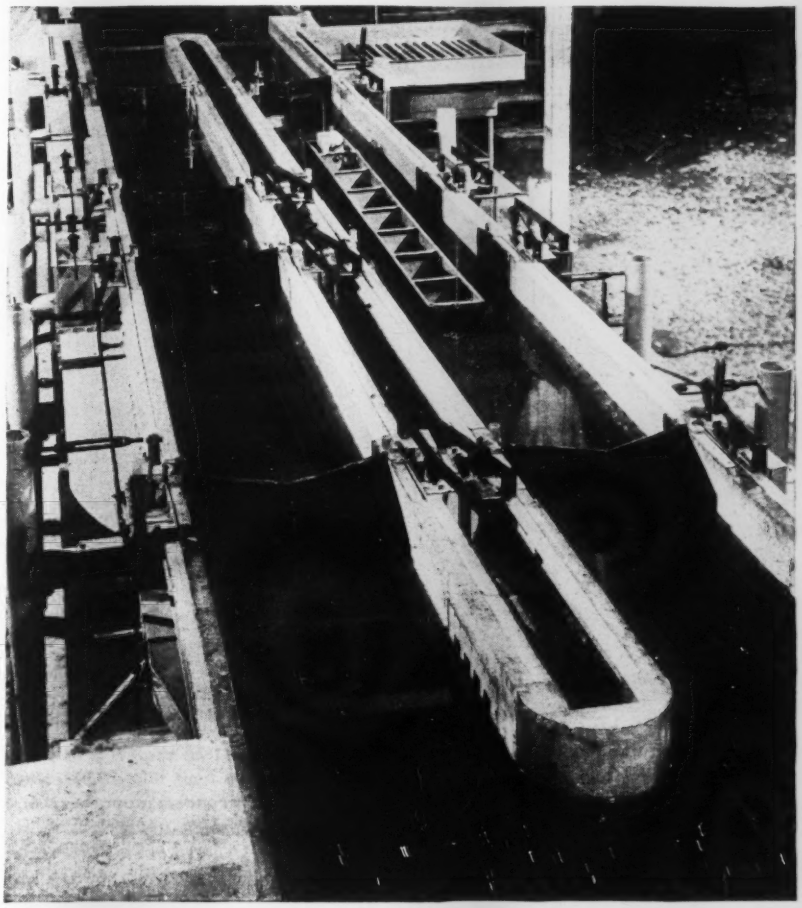


Fig. 2. Model of Sayreville ship and barge lock, 1:60 scale, for investigating salinity control in proposed New Jersey Ship Canal connecting the Delaware and Raritan rivers. Intermediate gates provide short chambers, which reduce the amount of water required for smaller vessels. Ship model is self-propelled, ballasted to simulate draft of loaded vessel.

Locking out, from upper to lower pool, will be according to standard procedure. However, in locking in, from lower to upper pool at the Sayreville end, a flushing action will be used to rid the lock of some of the salt water entering the chamber with the vessel. After the lower gates are closed, the discharge valves will be left open while the filling valves are open until a fresh water volume equivalent to half a lock full has been flushed through the chamber. Then the discharge gates will be closed and the lock filled in normal manner. Care will be used to keep the lower gates open only the minimum of time necessary for passage of a vessel.

Three methods employed

Thus there are three different controls planned to keep salt water out of the canal: (1) Flushing action of a constant discharge from the Delaware River diversion and from streams intercepted by the canal, of which all not required for lock operation will flow over the dam spillway; (2) Scavenging and return of

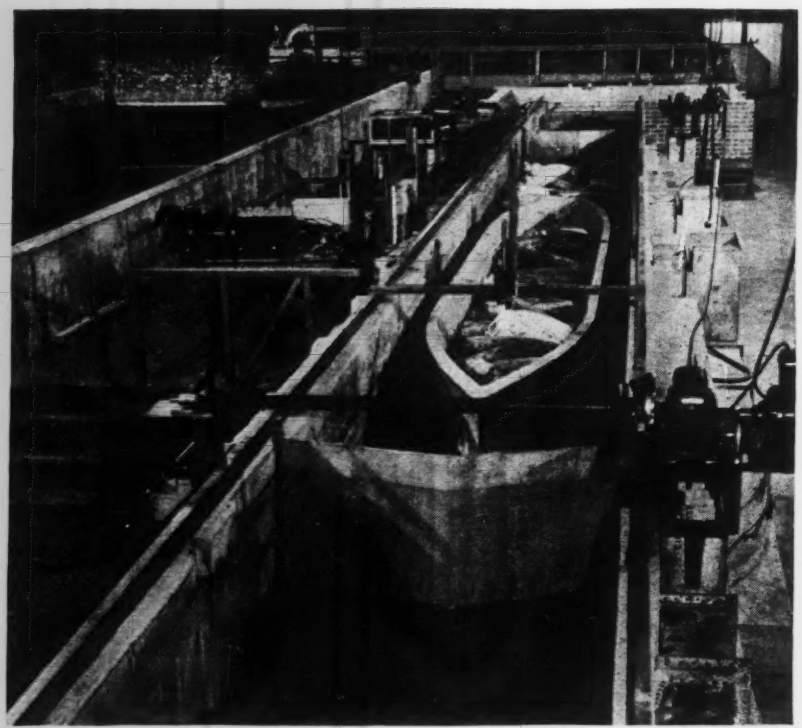


Fig. 3. A ship built to scale was used in the large model (1:20 scale) of a single lock chamber to determine effect on navigation of jet action from filling operations. This model, fully equipped with automatic control and recording apparatus also checked design of lock hydraulic system and effect of flushing operations.

salt water trapped in the upper pool sump; and (3) flushing of the locks during locking operations.

The above salinity control methods have been largely determined and verified by tests at Vicksburg. Three operating scale models were built at the laboratory for the investigation. Two partial models were also constructed to check the effect of model operation in tests of this kind, that is, to determine if results obtained from the scale models could be applied to full-scale structures.

Tests with 1:60 scale model

Tests were first conducted upon a 1:60 scale model of the Sayreville ship and barge locks, including a salt water lower pool and fresh water upper pool to determine the best method of operating the locks and the optimum quantity of flushing and scavenging water required to reduce the intrusion of salt into the upper pool to an acceptable minimum. A salinity of 13,000 ppm. was maintained in the lower pool, equal to that in upper Raritan Bay. (Salinity of sea water is 37,000 ppm.). Movement of salt water was checked by repeated specific gravity tests, and also visually by coloring the salt water with potassium permanganate. The colored salt water did not mix with fresh water, and its movement below the fresh water could be easily followed.

Model boats simulating the length, displacement and draft of several typical sizes of vessels expected to use the canal, were used for all tests. These were equipped to move under their own power through propellers driven by an electric motor on board, in order that the effect of propeller churning might be observed. The boats were locked in and out at a rate corresponding to the maximum traffic in any one week expected to use the canal, and as a conservative measure, the maximum week's traffic was extended for several consecutive weeks. All test operations were conducted on time schedules corresponding to full-scale operations, even to time required in opening and closing the gates.

Tests on this model revealed that flushing with half a lockful of water with each upbound lock opening was almost as effective as flushing with a full lockful, and considerably more effective than flushing with a smaller amount of water. In terms of continuous discharge this represents a requirement of 354 cfs., in contrast with 600 to 1,000 cfs., originally regarded as necessary.

The construction of solid guide walls extending into the lake was found to be advantageous, for they confine the water supplied to the lock hydraulic system, causing an appreciable flow toward the locks and thereby retarding the movement of salt water from the locks into the upper pool. Also, locating the intakes in the bottom of the deep sump between the guide walls above the lock was found to be more effective than locating them in the conventional manner in the lock walls, for the deeper intakes remove water of highest salt content from the upper pool.

Flushing found effective

The flushing process was found to reduce the amount of salt entering the upper pool by 98 percent over that coming in when no flushing was used. Each time the lower lock gate was opened for passage of a ship, a layer of salt water flowed into the lock along the bottom and under the fresh water. After the gates were closed and stability was established, this layer was found to be from 3 to 10 ft. deep ranging in salinity from 2,000 to 10,000 ppm., depending upon the size of ship and direction of travel. When the lock was flushed during filling, most of the salt in the bottom was washed out through the discharge ports. Some of the small amount remaining would pass into the upper pool when the upper gates were opened. However, it was found that eventually just as much salt water was returned from the upper to the lower pool through the lock filling and emptying systems and that saline stability was soon reached. The upper pool salinity at the stage of stability was the criterion upon which the method of lock operation was based.

Further tests were then conducted on a 1:150 scale model of the locks, the upper pool, the 7-mile lake created by a dam on the Raritan River at Sayreville, and the canal up to Mile 11. The purpose of this model was to find out if any salt water would work its way across the lake and up

the canal, and to determine the best location of approach channels through the lake. Simulating the maximum week's traffic for 16 consecutive weeks, a big boat was locked in and out from the upper pool into the lock and back out again, passing back and forth under its own power from a point about one-half mile above the lock. It was not locked out into the lower pool. Instead an amount of salt equal to that entering the lock at each opening of the lower gates, as determined from the 1:60 scale model, was dumped into the lock each time the boat was passed in and out. Flushing and scavenging operations were the same as on the 1:60 scale model, previously discussed. Another boat traveled back and forth across the lake to the canal entrance at a rate simulating maximum traffic.

This second set of tests revealed that the salinity in the lake built up eventually, under heavy traffic, to 27 ppm., then remained stationary. At the lake end of the canal proper the salinity increased to 18 ppm. during the first eight weeks, then gradually decreased during subsequent weeks to a stability of 14 ppm. At all other points within the canal there was no appreciable increase in salinity throughout the 16 week test period.

Still the engineers were not satisfied. In order to check whether there were any scale-effect differences between operations of a small model and a larger one, an indication of whether model results could be applied to full-scale structures, a 1:20 scale model of the lock was built. This was also used to investigate the design of the hydraulic systems for filling and emptying the lock as well as the effect of the top filling system upon navigation. In addition the reduction of salt water intrusion by the flushing procedure was checked.

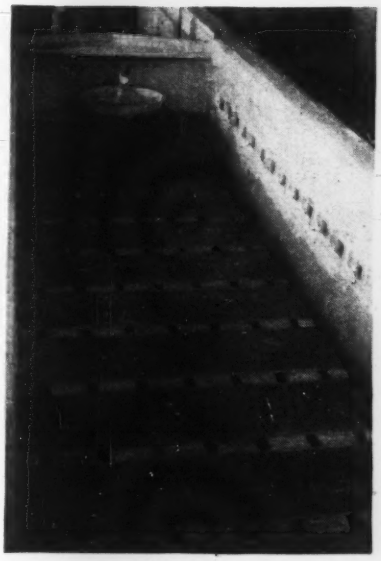


Fig. 4. View of empty lock in large-scale model shows unusually high position of filling ports on lock walls. Float at far end is automatic water level gage.

This model was equipped with elaborate automatic control and recording devices. A boat was placed within the lock, and effect of water flow through the lock was measured by resistance of an arm holding the vessel in place. Tests on the big model verified those made on the two smaller models as far as salinity control is concerned. They also demonstrate that the proposed design of locks is acceptable from the standpoint of navigation and that no difficulty should be experienced by any vessel in the lock due to jet action from the high filling ports during the filling and flushing operations.

Personnel

The tests were conducted under the direction of Col. E. W. Garbisch, district engineer, U. S. Engineer Office, New York District, New York. In accordance with the policy of Congress to recognize the interests and rights of the states in water utilization and control, the Chief of Engineers, U. S. Army, authorized demonstration of the operation of the models at U. S. Waterways Experiment Station at Vicksburg, Mississippi on April 16-17, 1945, under the direction of Brig. Gen. John J. Kingman. The district engineer, New York District, was represented at the demonstration by Lt. Col. C. K. Panish, chief of the engineering division. At the experiment station Gerard H. Matthes, director, was in general charge, with Capt. J. B. Tiffany, Jr., and Capt. G. B. Fenwick in direct charge of the models.

Cuts Along Road on Tulagi Island Wider at Bottom Than Top

"Perimeter Road," encircling the island of Tulagi, where our troops battered the Japanese in the South Pacific, had to be kept close to high tide level because the major portion of this small island is a narrow ridge whose slopes are for the most part too steep for roadways. Near the center of the island however, the ridge is exceptionally narrow and has a low spot across which early settlers had made a shallow cut to ease the grade in travel from one side of the island to the other.

When our troops took over it was found that a roadway had been cut through this narrow mountain pass and because the formation is firm enough to stand on any slope, the excavated width for the full depth of the cut had been made only such as was required for a roadway. The cut was not made wide enough for two vehicles to pass. At the top it was so narrow as to be easily crossed by a simple foot bridge. Although Perimeter Road is three miles long, the island width at this point is only ¼ mile. Behind the truck in the picture can be seen the roof of a wharf warehouse on the far side of the island.

A roadway cut in which excavation was kept to a minimum.

Precise Leveling Equipment Saves Money

Myron T. Jones
Registered Professional Engineer
Columbus, Ohio

Oscar J. Marshall
Associate Professor, Surveying and Geodesy
Ohio State University

***Contents in Brief**—Greater speed and accuracy obtained by the use of precise leveling equipment resulted in a considerable saving in the cost of establishing bench marks on two large projects in Ohio. Closures within first-order limits on one-way leveling obviated re-running any loop.*

ORDINARILY the use of precise levels and rods is thought of only in connection with first-order leveling done by the U. S. Geological Survey and the U. S. Coast and Geodetic Survey. These instruments can, however, be used to effect a saving in leveling costs on most projects involving an area of more than 6 sq.mi. when the terrain is flat or gently rolling.

The first project where precise leveling was used to economic advantage was a proposed flood control project in northern Ohio with an area of some 125 sq. mi. The watershed had a fall toward the north of 345 ft. in 24 miles, was practically level east and west, and had macadam roads at about 2-mile intervals. There were bench-marks about 8 miles apart, which had been established by the U.S.G.S., and a few established by the U.S.C.&G.S. along the northeastern boundary. Practically none of the work done by the four counties included in the watershed was tied into any sea-level bench-mark, the usual procedure being to assume a convenient bench-mark at the site of any proposed improvement. It was therefore necessary, as the first step in the survey, to establish benchmarks at convenient locations.

The work was started by using a wye level with a double-rodded line and reading the rod to thousandths. The maximum sight with good results was found to be about 300 ft., and the best progress that could be made was 4 miles per day. It was quickly seen that better progress must be made if the bench-marks were to be established over the entire area within the limits of the money provided.

A Zeiss precise level and two invar-steel metric rods were then used with exceptionally good results from both a technical and economic standpoint. It was possible to run from 7 to 12 miles a day, which meant that the amount of work was more than doubled. Closures on 16-mile circuits were well within the limits of first order work (0.017 ft. times the square root of the distance in miles) and these results were obtained with one way leveling; i.e., starting from a bench-mark and continuing in one direction in a loop along paved roads back to the starting point. Turns were taken on all bench-marks; maximum sights were 500 ft. and backsights and foresights were balanced through the use of three hair readings. The work was speeded up by the use of an automobile driven by the recorder and parked alongside the instrument at each set-up. Upon completion of a reading the instrument was loaded on the car and held by the instrument man during travel to the next station. As soon as the backsight reading was completed the rear rodman paced from the foresight to the point for the next set-up, which was reached about the time the foresight reading was completed and the instrument brought to the new station. The rear rodman then paced to the foresight point, where he became the front rodman, drove his turning-point pin, and was ready for the foresight reading by the time the backsight reading had been taken. Under favorable conditions, 15 miles a day could be covered in this manner.

The use of precise leveling equipment makes it possible for the surveyor to increase both the speed and accuracy of his work. The advantages may be summarized as follows:

1. A more powerful telescope,

Fig. 1. The accuracy and speed obtained by using precise leveling equipment saved money on two large projects. The instrument was carried from set-up to set-up on a car driven by the recorder.

combined with a more sensitive bubble, which is read from the eyepiece end of the telescope, permits the use of direct readings (no targets) at 500 ft. without loss of accuracy, and with a great saving in time and increase in progress.

2. Reading of three (stadia) wires eliminates blunders as the work progresses by checking the half intervals, and provides a definite means of balancing back sight and foresight distances. The recorder objects instantly to any discrepancy exceeding 2 mm. between the upper half interval and lower half interval, and the readings are repeated without prejudice.

3. The bubble can be centered with approximately four times the precision of the usual bubble in a graduated vial. This is accomplished by a special prism arrangement which enables the observer to view diagonally opposite quarters of the bubble simultaneously, and is so designed that when the two curved ends appear to form a half circle the bubble is centered. The bubble is controlled by a slow motion micrometer screw which tilts the telescope about a horizontal axis directly over the center of the vertical spindle. This arrangement makes it possible to maintain first-order accuracy, if desired, with a bubble that moves 1 mm. for each 5 sec. of arc, and without shading the instrument from the sun.

4. The level is provided with a universal bubble for preliminary leveling, which can thus be accomplished very rapidly with the three-screw leveling head. The sensitive bubble and micrometer screw are used only for the particular position of the telescope when sighted toward the rod.

5. The rods are graduated in centimeters on an invar-steel strip, which is not affected by moisture and has a negligible change due to temperature variations. Readings on three wires are estimated to 1 mm., giving an average rod reading with a theoretical precision of $\frac{1}{3}$ mm.

6. Each rod is equipped with a universal level bubble. This enables the rodman to keep the rod plumb for each reading.

7. Tapered steel turning pins are driven until solid, thus avoiding errors from poorly selected turning points.

The precise nature of the instruments, with the possibility for constant checking of results as the work progresses, made it possible to obtain better than the required results without the necessity of re-running any line, although circuits of several miles were run. Closures varied from 0.01 ft. to 0.10 ft. in 16-mile circuits, with an average closure of 0.05 ft. per circuit.

Fig. 2. Invar-steel metric rods are not affected by moisture and temperature changes, and the universal level enables the rodman to plumb for each reading. The use of tapered steel pins driven until solid avoids errors when good turning points like the above are not available.

After a few hours instruction, any competent leveler should quickly become accustomed to a precise instrument. Duties of the recorder and two rodmen are relatively simple and proficiency of the entire party should be attained within two days. The recorder should also be the chief of party.

Used on second project

The use of precise leveling equipment was also a success on a 12,000 acre ordnance plant in central Ohio. Here the problem was to establish accurate bench-marks at 1,000-ft. intervals. The terrain was very similar to the flood control project in northern Ohio, previously referred to, in that it was flat and had macadam roads at about 1-mile intervals. A network of accurate bench-marks was established along these roads at an approximate saving of 50 percent in costs, with a much higher degree of accuracy than would have been obtained with a wye level. While the accuracy that is easily obtainable with precise equipment is usually not required, most anyone would agree that if these results can be obtained at a lower cost, this equipment should come into general use on such projects as flood control; large industrial plant layouts; sanitary district work; and the establishment of permanent bench-marks for state highway systems, counties and cities.

The results obtained on the two projects mentioned in this article proved that engineers with the usual amount of practical experience in ordinary leveling could accomplish better results using precise equipment, with a saving in cost.

Before the war a Zeiss precise level, which was the type used on the projects referred to, could be purchased for $300, and the rods at $125 each, making the total cost of special equipment $550. If a project requires benchmarks costing $1,100 when ordinary equipment is used, better results from a technical standpoint can be secured for the same investment with precise equipment, and the additional instruments would be paid for. From that point on, about 50 percent should be saved in time and money.

One or more American instrument manufacturers are now making levels of a design comparable to the instrument described. The somewhat higher cost of a level made in the United States is still a very good investment for a project involving 100 miles or more of first or second order leveling.

The problem of obtaining proper equipment during wartime can often be solved by rentals from engineering colleges, as its use is only required for the few weeks necessary to establish precise control on, even the very largest of projects.

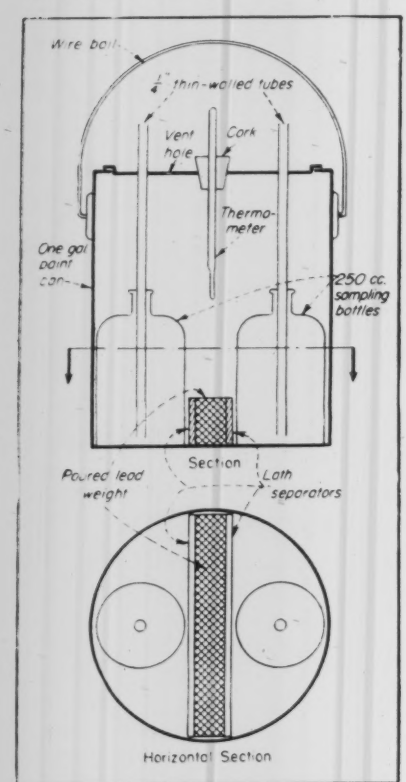
From Field and Office

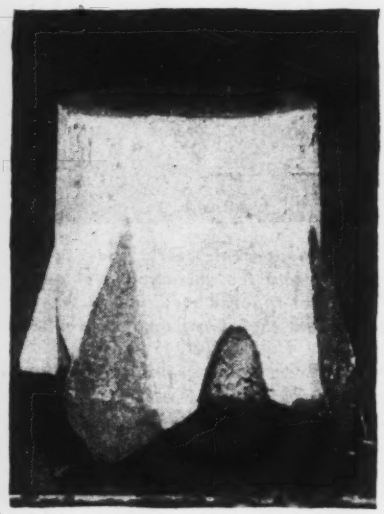
WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

Cheap Water Sampler Easily Made from Paint Can

A simple device for obtaining biochemical oxygen demand or dissolved oxygen samples can be made quickly and cheaply from a 1-gal. paint can and materials usually found in a waterworks or sewage treatment plant. Since it is so simple, its use is practically foolproof.

Made as shown in the accompanying drawing, the sampler is simply tied to a length of sash cord and lowered into the liquid to be sampled. The position of the lead weight not only submerges the can, but also holds it upright so that the sample bottles do not tip. Entrained air is expelled from the bottles by the arrangement of the tubes and vent hole, since a volume of water at least three times that of the bottle must pass through each one before the can is filled.—GERALD J. MCINERNEY, *Superintendent of Sewage Treatment, Elmira, N. Y.*





Drill Bit Designed To Penetrate Coral

A pneumatic drill bit with extra cutting edges and designed to reduce the "spoil" that packs around the bit collar has been devised by William J. Scott, Carpenter's Mate, USNR. Standard bits were penetrating the coral efficiently, but withdrawal was made difficult by the packed "spoil" around the collar. The Scott bit illustrated, proved by consistent tests, has eliminated the removal difficulties. Mr. Scott, a Seabee on duty in the Pacific is a former maintenance man with Standard Oil of New Jersey at Bayway.

Knife for Cutting Corrugated Sheet Metal

When the use of shears to cut corrugated sheet metal proved slow and allowed extensive "creep", the 122nd U. S. Navy Construction Battalion, built a hand-operated knife out of salvaged metal that has permitted accurate work and resulted in a large saving of time. When using shears it was necessary to allow for as much as a 1½-in. "creep" in cutting a sheet 27½ in. wide. With the cutter illustrated it is necessary to allow for only ⅛-in. creep, which conserves metal and also permits much more accurate matching.

The knife is of the scissor type consisting of a hinged ⅜-in. tempered-steel cutting blade that is faced between two fixed ⅜-in. plates. The blade is equipped with a 3x3x⅜-in. angle handle 54 in. long, another angle of the same cross section and 21 in. long being welded to the outer end to provide a large surface for applying pressure.

The upper edges of the fixed plates are corrugated to correspond with the sheets being cut and are bolted to 6x6-in. timbers, the plates being countersunk and the bolt heads ground so that they do not project beyond the surfaces of the plates. A 3x3x⅜-in. angle is welded to the top of one of the fixed plates to serve as a guide for the cutting edge and a slot is provided in this plate through which the corrugated metal sheets can be slid into place. Opposite the guide plate, a clamp consisting of 2x4-in. timber hinged on one end is provided to secure the sheet metal as it is cut. The cutting assembly is mounted flush with a timber platform which provides necessary working space.

The above material is an abstract of a recent item in *Construction Battalion Activities* published by the U. S. Navy.

Job-made knife permits more accurate and rapid work in cutting corrugated metal sheets.

WHICH OIL DO YOU USE?

I JUST LUBRICATE
A LAZY OIL THAT DOES ONLY ONE JOB?
-OR HARD-WORKING TALPEX THAT LUBRICATES AND DOES 4 EXTRA JOBS?
CHASES AWAY CARBON AND LACQUER
DISCOURAGES SLUDGE
HELPS CUT ENGINE WEAR
IS NON-CORROSIVE

An oil that merely lubricates—or that does only one or two of the other critical jobs in your engines—is a lazy oil. With today's operating conditions . . . the high cost of repairs . . . the scarcity of good spare parts . . . you simply can't afford to use a lazy oil.

To get the utmost in performance from your engines, use hard-working Shell TALPEX. This versatile oil has *all* the properties needed to do the many critical jobs necessary to keep your engines running smoothly and efficiently under the most severe operating conditions.

SHELL TALPEX

1. Has high detergency. Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.
2. Has exceptional Oxidation Stability. Holds to a minimum the formation of sludge, lacquer and other products of deterioration.
3. Has low Carbon-Forming Tendency. Reduces ring sticking and wear. Lengthens engine life.
4. Is non-corrosive to alloy bearings. Protects all lubricated engine parts against corrosion.

If the oil you now use is not doing all these jobs, it's lazy—should be changed to hard-working Talpex. Ask the Shell man to show you why.

SHELL

TALPEX

THE ALL-PURPOSE, HEAVY-DUTY LUBRICANT

for trucks, buses, tractors, shovels, stationary and marine Diesels.

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

EARTHWORK, CONCRETE LINING, ETC., RATHDRUM PRAIRIE PROJECT, IDAHO

OWNER: Bureau of Reclamation, Coeur d'Alene, Idaho.

PROJECT: Earthwork, concrete lining, pipelines, and structures for canal and lateral system, Post Falls Unit, Rathdrum Prairie Irrigation Project, located near Coeur d'Alene, Idaho. Includes all necessary excavation for canal and structures; compacting embankments; compacted earth lining of canal; gravel blanket in canal; concrete in structures; concrete in canal lining; removing, salvaging and re-erecting 24-in. wood-stave pipe; pedestals for wood-stave pipe; laying concrete pipe; installing gates and miscellaneous metalwork; and furnishing, constructing and removing temporary construction at railroad crossing. (Spec. No. 1094).

CONDITIONS: Government to furnish cement; reinforcement bars; precast concrete pipe; staves, pedestals, etc., for wood-stave pipe; steel pipe connections; pipe fittings and valves; weep pipes; gates, weir crests, etc., for turnouts, checks, weirs and delivery boxes; lumber for permanent installation; bolts, washers, etc.; paint and coating materials. Contractor to furnish all other materials, including that which is necessary to complete work but not part of completed structure, such as form materials and temporary supports. Time for completion: work on Main canal to Station 90, and all work on lateral 8.8 within 60 calendar days; all remaining work on Schedule 1 in 150 calendar days; and all work on Schedule 2 within 240 calendar days. Priority rating AA-3. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.20 to $1.75 per hour; semi-skilled, 95c. to $1.25; and common, $1.00.

BIDS: Six bids were opened March 30, 1945, ranging from the low of $111,395 to $203,319.

LIST OF BIDDERS: (Combination of Schedules 1 and 2).

1. Northwestern Engineering Co., Rapid City, S. Dak. (low bidder) $111,395
2. Sather & Sons, Spokane, Wash. 147,738
3. Charles A. Power, Spokane, Wash. 153,865
4. Roy L. Bair, Spokane, Wash. 166,153
5. Henry L. Horn, Caldwell, Idaho 190,293
6. W. C. Smith Co., Portland, Ore. 203,319

Schedule No. 1

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation, common, for canal	35,000 c. y.	$0.20	$0.28	$0.42
2. Excavation, rock, for canal	100 c. y.	2.20	1.60	2.50
3. Overhaul (station cu. yd.)	2,000 c. y.	.05	.03	.03
4. Compacting embankments	10,000 c. y.	.15	.30	.35
5. Compacted earth lining of canal	5,600 c. y.	1.20	2.00	2.00
6. Gravel blanket in canal	5,400 c. y.	.75	1.35	1.30
7. Excav., common, for pipe trench on lateral 6.7–2.4	8,000 c. y.	.40	.60	.40
8. Excav., rock, for pipe trench on lateral 6.7–2.4	100 c. y.	4.00	2.00	2.50
9. Backfill of pipe trench on lateral 6.7–2.4	8,000 c. y.	.52	.30	.20
10. Trimming earth found'n. for conc. lining	3,000 s. y.	.60	1.00	.20
11. Excavation, common, for structures	600 c. y.	1.20	2.00	1.50
12. Excavation, rock, for structures	10 c. y.	4.00	5.00	3.00
13. Backfill	400 c. y.	.90	.40	.40
14. Compacting backfill	300 c. y.	1.10	.75	1.00
15. Concrete in structures	130 c. y.	45.00	50.00	45.00
16. Concrete in canal lining	315 c. y.	22.50	30.00	27.00
17. Placing reinforcement bars	28,000 lb.	.045	.04	.05
18. Dry-rock paving	100 s. y.	3.00	4.00	3.00
19. Erecting timber in structures	2 Mbm.	100.00	50.00	60.00
20. Remove and salvage exist. 24-in. wood-stave pipe	815 l. f.	.54	.50	.40
21. Erect 24-in. wood-stave pipe	500 l. f.	1.00	1.75	1.50
22. Cut and slot ends of staves	100 ends	.20	.25	.30
23. Place pedestals for 24-in. wood-stave pipe	50 ea.	1.00	3.00	4.00
24. Lay 4-in. concrete pipe	10 l. f.	.37	.30	.30
25. Lay 6-in. concrete pipe	60 l. f.	.45	.40	.40
26. Lay 8-in. concrete pipe	10 l. f.	.60	.60	.50
27. Lay 10-in. concrete pipe	10 l. f.	.75	.75	.65
28. Lay 12-in. concrete pipe	20 l. f.	.75	.90	[illegible]
29. Lay 15-in. concrete pipe	210 l. f.	.75	1.10	[illegible]
30. Lay 18-in. concrete pipe	5,100 l. f.	.90	1.20	[illegible]
31. Lay 21-in. concrete pipe	2,200 l. f.	1.00	1.40	[illegible]
32. Lay 24-in. concrete pipe	2,050 l. f.	1.10	1.60	[illegible]
33. Lay 27-in. concrete pipe	5,000 l. f.	1.50	1.75	[illegible]
34. Lay 30-in. concrete pipe	16 l. f.	3.00	1.90	[illegible]
35. Install gates and misc. metal work	1,000 lb.	.12	.15	[illegible]

Schedule No. 2

36. Excavation, common, for canal	70,000 c. y.	$0.19	$0.28	[illegible]
37. Excavation, rock, for canal	100 c. y.	2.00	1.60	[illegible]
38. Overhaul (station cu. yd.)	16,000 c. y.	.05	.03	[illegible]
39. Compacting embankments	35,000 c. y.	.15	.30	[illegible]
40. Compacted earth lining of canal	1,300 c. y.	1.20	2.50	[illegible]
41. Gravel blanket in canal	1,100 c. y.	.75	1.50	[illegible]
42. Excav., common, for structures	2,500 c. y.	1.20	1.00	[illegible]
43. Excav., rock, for structures	10 c. y.	4.00	3.00	[illegible]
44. Backfill	1,200 c. y.	.90	.40	[illegible]
45. Compacting backfill	1,000 c. y.	1.10	.75	[illegible]
46. Concrete in structures	190 c. y.	45.00	48.00	[illegible]
47. Placing reinforcement bars	15,000 lb.	.045	.04	[illegible]
48. Dry-rock paving	300 s. y.	3.00	4.00	[illegible]
49. Erecting timber in structures	7 Mbm.	100.00	50.00	[illegible]
50. Erect 42-in. wood-stave pipe	4,500 l.f.	1.30	1.75	[illegible]
51. Cut and slot ends of staves	500 ends	.20	.50	[illegible]
52. Place pedestals for wood-stave pipe	455 ea.	2.50	3.00	[illegible]
53. Lay 10-in. concrete pipe	12 l. f.	.75	.75	[illegible]
54. Lay 15-in. concrete pipe	455 l. f.	.80	1.10	[illegible]
55. Lay 18-in. concrete pipe	216 l. f.	1.00	1.20	[illegible]
56. Lay 24-in. concrete pipe	102 l. f.	1.10	1.60	[illegible]
57. Lay 27-in. concrete pipe	80 l. f.	1.20	1.75	[illegible]
58. Lay 30-in. concrete pipe	156 l. f.	3.00	1.90	[illegible]
59. Lay 42-in. concrete pipe	40 l. f.	4.00	2.50	[illegible]
60. Install gates and misc. metal work	10,000 lb.	.12	.15	[illegible]
61. Furnishing, constructing and removing temporary construction at railroad crossing	Lump Sum	400.00	250.00	[illegible]

REFUSE INCINERATOR, LYTTONSVILLE, MARYLAND

OWNER: Washington Suburban Sanitary Comn., Hyattsville, Md.; Harry R. Hall, chief engineer.

PROJECT: Construction of a 150-ton refuse incinerator, including appurtenant structures. Building is 50- by 130-ft. reinforced concrete, structural steel and tile. Project also includes construction of chimney, roads, drains, and sewers.

CONDITIONS: Incinerator building has been designed to house units of size originally specified, but certain variations are permitted in design, including assemblies, which may result in an installation being approved that may require structural changes in the building. All bidders propose to furnish same type incinerator, installed by the Nichols Engineering and Research Corp. Contractor to furnish all labor and materials except those specified as being furnished by the Commission. Time for completion: 200 consecutive days. Wage rates are those prevailing in Washington and vicinity: skilled labor, $1.50 to $2.00 per hr.; semi-skilled, $1.10 to $1.62; and common, 90c. Priority rating AA-3 on equipment, materials and machinery.

BIDS: Five bids were received March 23, 1945, ranging from the low of $248,800 to $299,675. Engineer's estimate $208,000.

LIST OF BIDDERS:

1. F. H. Martell Co., Washington, D.C. (low bidder) $248,800
2. Nichols Engr. & Research Corp., New York, N. Y. 256,397
3. J. D. Hedin Constr. Co., Washington, D.C. 264,796
4. Potts & Callahan Cont'g. Co., Washington, D.C. 293,000
5. Victor Frankil (trading as Baltimore Contractors), Baltimore, Md. 299,675

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Constructing refuse incinerator	Lump sum	$234,570.00	$242,281.00	$253,698.[illegible]
2. Structure excavation	3,450 c. y.	.80	1.17	[illegible]
3. Trench excavation	610 c. y.	10.00	1.30	[illegible]
4. Roadway and grading excavation	570 c. y.	1.00	1.17	[illegible]
5. Borrow excavation	4,500 c. y.	1.00	1.80	[illegible]
6. Rock excavation	50 c. y.	6.00	10.40	[illegible]

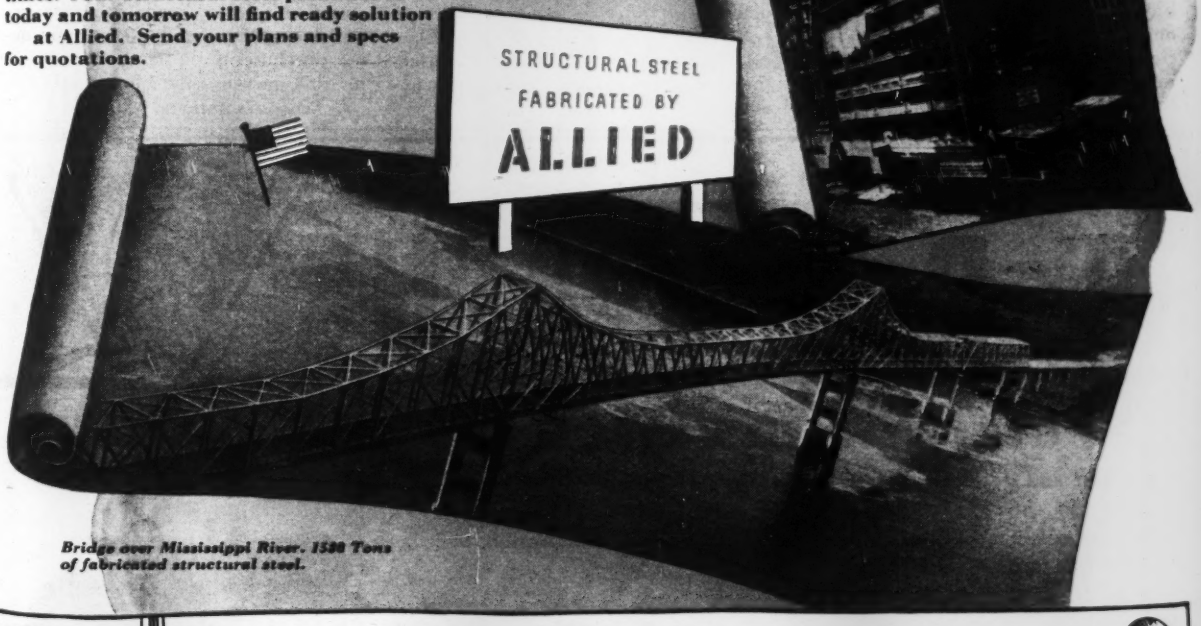
Partial view of fabricating steel shops of shipyards. Total, 4789 tons of structural steel.

1956 Tons of fabricated structural steel delivered on a schedule which made it possible to erect this 25-story steel building in 36 days. (Below)

"ALLIED has the composite facilities we need to get our structural up fast"

Experience—the "safe light to walk by"—reflects truly in the structures throughout the country in which Allied has fabricated the structural steel.

Allied engineers, with vision and creative ability, have served industry for a quarter of a century, co-operating with contractors, engineers, architects, and erectors . . . everywhere. The experience thus accumulated, together with Allied's unlimited plant facilities for fabrication of mass tonnage, assures erection on the due date—even in these turbulent times. *Your* structural steel problems of today and tomorrow will find ready solution at Allied. Send your plans and specs for quotations.



Bridge over Mississippi River. 1538 Tons of fabricated structural steel.

ALLIED

STRUCTURAL STEEL COMPANIES

Three companies, with total structural steel capacity of 75,000 tons, who have pooled their facilities under centralized control and responsibility.

Engineers • Fabricators • Erectors

- **CLINTON BRIDGE WORKS, 101 S. Second St., Clinton, Iowa**
- **GAGE STRUCTURAL STEEL CO., 3123-41 S. Hoyne Ave., Chicago 8, Ill.**
- **MIDLAND STRUCTURAL STEEL CO., 1300-20 S. 54th Ave., Cicero 50, Ill.**

Address the company nearest you

The Week IN ENGINEERING AND CONSTRUCTION

(Continued from page 58)

Florida overseas road may become toll-free

The Florida legislature is favorably considering a bill to authorize the state road department to buy or lease the Overseas Road and Toll Bridge district's portion of the Miami Key-West highway and free it of tolls.

The bill also seeks to authorize the state board of administration to take over supervision and payment of the district's $3,000,000 debt—bonds held by the Reconstruction Finance Corp.

A 40-mi. section in the middle of the highway is all that is affected by the bill, as the north and south ends were built by the state and never have been subject to tolls.

The last link of the 152-mi. highway and series of bridges between the Florida mainland and Key West was finished last year. It was built on the right-of-way of the Florida East Coast railroad track which was destroyed by the 1935 hurricane.

Montgomery to manage huge magnesium plant

J. M. Montgomery & Co., Inc., Los Angeles engineering firm, has been appointed to manage the Defense Plant Corp.'s huge magnesium plant near Las Vegas, Nev., which until recently was operated by Basic Magnesium, Inc., and managed by the Anaconda Copper Mining Co.

The Montgomery firm, formed in 1941 by seven engineers of southern California's Metropolitan Water District, has a 5-year contract to operate the plant's water and power facilities for DPC. The engineering company designed and supervised construction of the facilities which transmit power from Boulder Dam and water from Lake Mead, 17 miles from the magnesium plant.

Stauffer Chemical Co., Western Electro Chemical Co. and Rheem Manufacturing Co. are taking over various operations of the works.

N. C. court restrains TVA on land acquisition

Judge E. Yates Webb of the Western North Carolina District United States Court has ruled that the Tennessee Valley Authority overstepped its legal rights in condemning 44,000 acres of land lying between the Fontana Dam basin shoreline and the Great Smoky National Park. The decision was based on the grounds that instead of being used for the Fontana project the lands, after being condemned by TVA, were to be deeded to the park permanently.

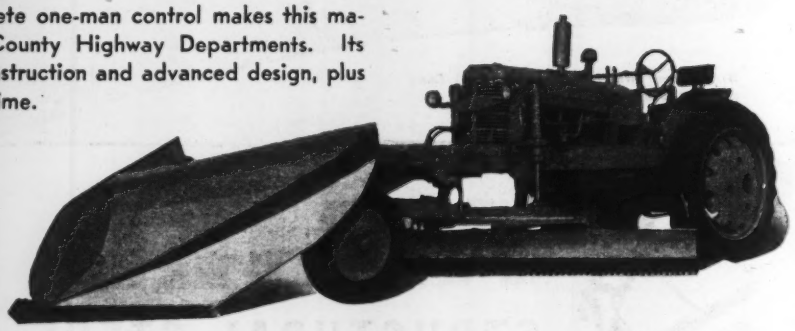
Said the court. "In giving the Tennessee Valley Authority Act the most liberal construction which the court could place upon the wording of the same, the could would not be justified in permitting private property to be condemned when not needed for any use or purpose authorized by the acts of Congress and when said property is to be deeded by the condemnor for a purpose entirely foreign to that for which the authority was created."

The area in question has been made inaccessible by waters of the Fontana reservoir. TVA sought to avoid the construction of new roads into the area which were estimated to cost more than the purchase of the land. Were it not for this decision, the park would have received an additional valuable area.

TROJAN

UTILITY SPEED PATROLS

Are fast and dependable. Complete one-man control makes this machine the choice of State and County Highway Departments. Its popularity is based on superior construction and advanced design, plus the ability to do more work in less time.



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Represented by the International Harvester Industrial Dealer in your Community

OTHER TROJAN TOOLS INCLUDE SELF POWERED SPEED TAMPERS WHICH ARE BEING USED ON AIRPORT CONSTRUCTION JOBS

IT'S THE "Know-how" THAT COUNTS

● When you call in the Raymond organization, you are turning your foundation contract over to men who are expertly trained and thoroughly experienced in every scope of the work. They know their jobs—from the preliminary investigation of underground conditions to the complete installation of the foundation.

They also know their equipment—how to handle the largest rig and the smallest tool needed in the efficient placing of Raymond Piles. And, too—they know their responsibility for carrying out large and small jobs to successful completion.

Since 1897 Raymond Concrete Piles have been continuously and increasingly used by the architectural and engineering professions. Today over 50 million lineal feet of these sturdy cast-in-place piles are in world-wide use. With over 11,000 contracts to its credit, Raymond has accumulated a vast fund of knowledge, experience and ability. Write, wire, cable or phone for a competent Raymond engineer to discuss your next project with you.

SCOPE OF RAYMOND'S ACTIVITIES

includes every recognized type of pile foundation—concrete, composite, precast, steel, pipe and wood. Also caissons, construction involving shore protection, ship building facilities, harbor and river improvements, borings for soil investigation.

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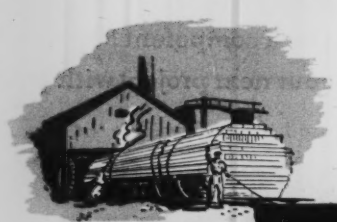
Treatments for wood to meet many conditions are available through American Lumber & Treating Company. WOLMANIZED LUMBER* protects superstructures against decay and termite attack. Timbers treated with MINALITH* fire-retardant are flameproof. CREOSOTING guards against marine borer attack below the water line.

***Pressure Treatment* ASSURES THOROUGH PROTECTION**

Pressure treatment under exacting laboratory control drives these protective materials deep into the wood. Hundreds of millions of feet of lumber so treated is in service all over the world. The excellent performance obtained is evidence of their dependability.



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Elections and Activities

Charles D. Faucette has been elected president of the Durham, N. C., Engineers Club at a meeting of the organization. He succeeds W. M. Piatt. Other officers elected for the year are: H. S. Crain, vice president; Guy H. Bennett, re-elected secretary; T. C. Cooke, re-elected treasurer; Hunter B. Jones, junior director; and R. E. Kepler, senior director.

The Engineers Club of Birmingham, Ala., has elected the following officers and directors: John T. Benton, president; Ralph Y. MacIntyre, vice president; Sprigg C. Ebbert, secretary-treasurer. J. H. Atkins, Arthur J. Blair and Paul Wright directors.

J. E. Burr has been named president of the Houston, Tex., Engineer's Club to succeed R. S. J. Wheeler. Other new officers named for the year beginning June 1 are: F. Y. Hutchinson, first vice president; C. C. Friedrich, second vice president; Leland V. Dolan, secretary; and F. E. Zumwalt, treasurer.

Officers for 1945-46 elected at a recent meeting of the Junior Branch of the Metropolitan Section, Am. Soc. C. E., include: president, Bro. Joseph McCabe, instructor at Manhattan College; 1st vice president, Edwin M. Erickson, assistant naval architect, U. S. Navy Yard, Brooklyn; 2nd vice president, Joseph M. Kennedy, senior engineer, North Atlantic Division, U. S. Engineer Dept.; secretary, Charles A. Knapp, designer with the Dorr Co.; and treasurer, Nathan Brenner, assistant engineer, U. S. Engineer Dept.

S. M. Marco, professor of mechanical engineering at Ohio State University, has been elected president of the Franklin County, Ohio, Chapter of Professional Engineers. John J. Heier, bridge engineer for the Ohio Highway Department, was elected vice president, and Eugene W. Davis, engineer of the highway department, was named secretary-treasurer. Directors Kermit Herndon, Ohio State University, for a three-year term, and the following for one-year terms: Guy H. Elbin, bridge engineer in the office of the Franklin county engineer; Earl Sanderson, highway bridge engineer; Ernest Stork, municipal engineer; A. P. Harness, consulting engineer; and Walter E. Fouts, engineer of the Ohio Bell Telephone Co.

For the TOUGH Jobs Ahead!

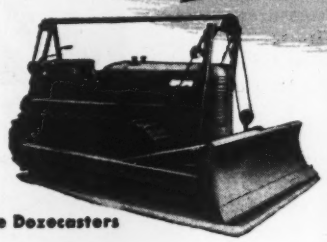
GAR WOOD ROAD MACHINERY

WITH ALLIS-CHALMERS DIESEL POWER

When the tremendous after-Victory program of road building and construction breaks, all present indications point to these conditions: 1. An abrupt change back to the prewar trends of competitive contracting. 2. Ever lower costs will become increasingly important. 3. The profitable business will go to the contractors who use the most efficient methods and machinery.

You can meet these conditions with Gar Wood Road Machinery and Allis-Chalmers Diesel Power. Here is an unbeatable combination that has what it takes to shove through the toughest jobs, fast—machinery that is dependable, economical, proved. Plan now to standardize on the complete line of Gar Wood Road Machinery. Get the facts from your Allis-Chalmers dealer.

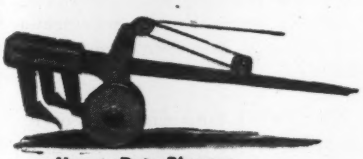
SPECIFY GAR WOOD FOR OUTSTANDING PERFORMANCE



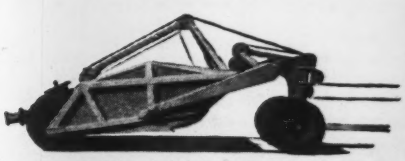
Cable Dozecasters

4-Wheel Hydraulic Scrapers

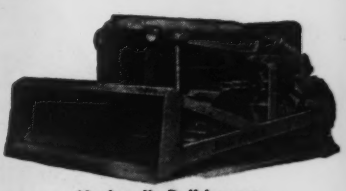
2-Wheel Hydraulic Scrapers



Heavy Duty Rippers



4-Wheel Cable Scrapers



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GW ROAD MACHINERY is Sold Through ALLIS-CHALMERS Dealers Everywhere

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OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS

for HIGHWAYS & AIRPORTS

The modern JACKSON Vibratory Paving Tube is the only full-width internal vibrator for highway and airport paving, backed by many years satisfactory use under widely varying conditions. Proved performance certifies to the contractor and engineer that they will get desired results in efficient and economical operation, placement, density, strength and wearing surface of the finished slab. This holds true for the usual mixes designed for vibratory placement and those made with air entraining cements.

The JACKSON Tube is super-powerful, with plenty of reserve beyond the toughest jobs encountered . . . is easily attached to any modern conventional finishing machine . . . available in 10 to 25 foot widths . . . simple, dependable with all "bugs" out.

Get up-to-date on vibratory placement of pavement concrete. Write today for new JACKSON folder.

JACKSON VIBRATORY PAVING TUBE

Standard, full-width, dual vibratory tubes submerged horizontally in concrete have proved most efficient through years of exhaustive tests and extensive use. Powerful high-frequency vibratory impulses are transmitted in force through the thickest slab, quickly transforming the stiffest mixes into uniformly workable condition. If desired, other types of vibratory elements can be easily substituted with the same basic frame and carriage.

The reserve capacity of the power plant can be used to run hand operated vibrators in conjunction with the tube. The power plant also generates power for electric tools and lights used on night clean-up or emergency operations.

THERE IS A RIGHT JACKSON CONCRETE VIBRATOR FOR EVERY JOB

MANUFACTURED FOR

JACKSON VIBRATORS, Inc.

by ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

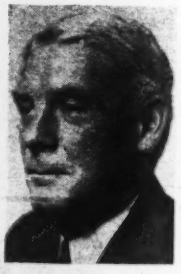
Manufacturers' Activities

MERLE J. TREES has been elected to the newly created position of chairman of the board of the Chicago Bridge and Iron Co., Chicago, Ill., and **Horace B. Horton** has been elected president to succeed the late George T. Horton.

Merle J. Trees

A native of Illinois, Mr. Trees attended the University of Illinois, receiving his bachelor of science degree in 1907 and a civil engineering degree in 1911. He has been associated with the Chicago Bridge and Iron Co. since 1907 when he joined the firm as an estimator. He advanced successively through various important positions and was made executive vice president in 1942, which position he held until his recent promotion.

Mr. Horton has also been associated with the Chicago Bridge and Iron Co. since 1907. He was made treasurer and a director of the company in 1912, and vice president in 1944. He will continue to serve as treasurer. Mr. Horton was graduated from the University of Chicago in 1907 and took post-graduate study in engineering at the University of Illinois.



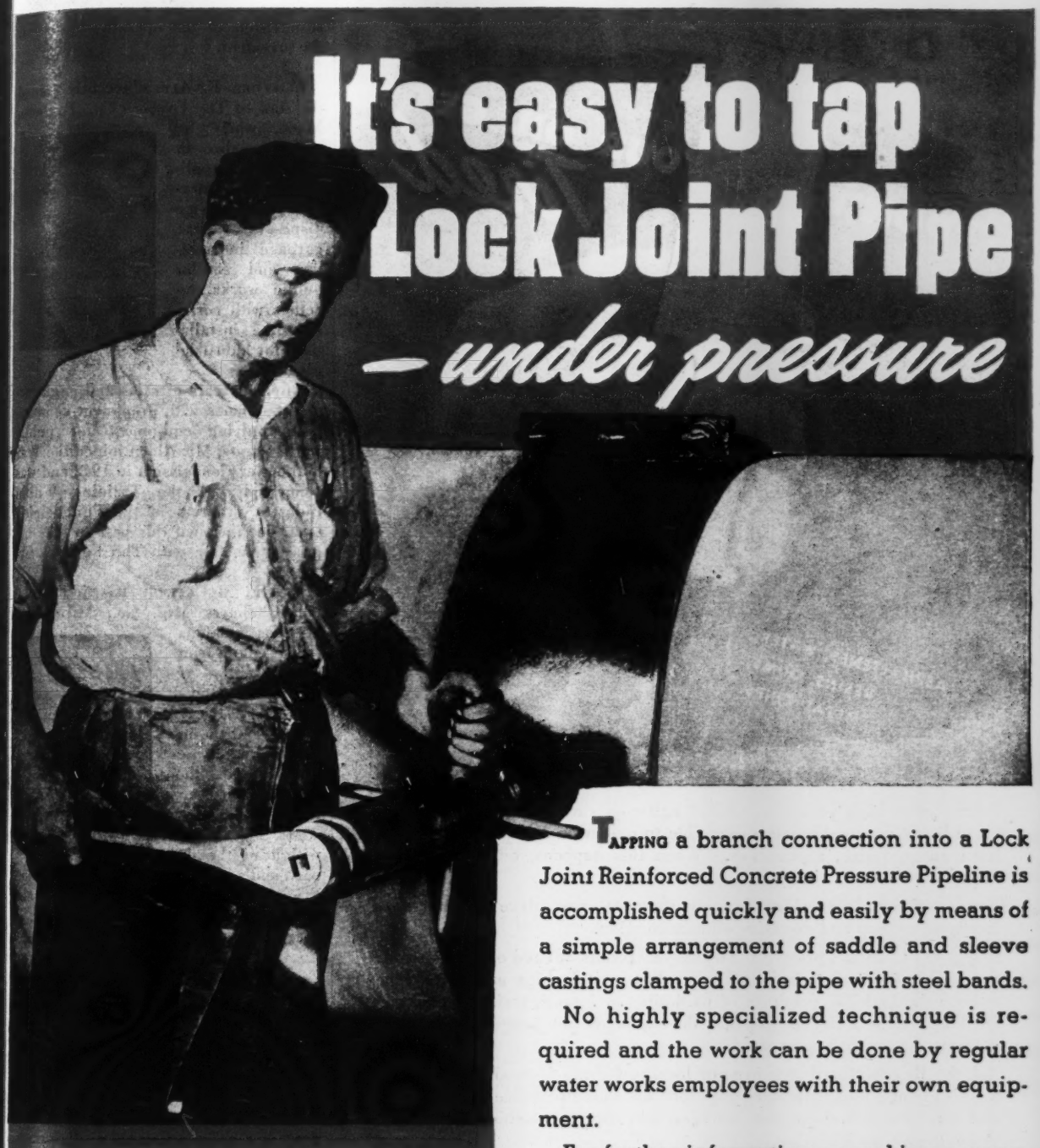
Horace B. Horton

THE APPOINTMENT of Charles C. Cheyney as sales manager of Buffalo Forge Co. is announced. He was for a number of years Chicago representative and recently has been assistant sales manager.

FOLLOWING the resignation of R. R. Howard as vice-president and general sales manager of Anthony Co., Streator, Ill., C. H. Worrells, for many years treasurer, has become general sales manager. He has been with the company for twenty years.

Glenn A. Duis, for many years a consultant and director, has been elected executive vice-president. He takes over

It's easy to tap Lock Joint Pipe — under pressure



TAPPING a branch connection into a Lock Joint Reinforced Concrete Pressure Pipeline is accomplished quickly and easily by means of a simple arrangement of saddle and sleeve castings clamped to the pipe with steel bands.

No highly specialized technique is required and the work can be done by regular water works employees with their own equipment.

For further information on making connections under pressure to existing Reinforced Concrete Pressure Pipelines, you'll find the Lock Joint Pipe Company at your service.

LOCK JOINT Reinforced Concrete PRESSURE PIPE

LOCK JOINT PIPE COMPANY

Established 1905

P. O. BOX 269, EAST ORANGE, N. J.

Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill. Joplin, Mo. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

Intense heat, high pressures, violent agitation cause weaker molecules in oil to break down—become susceptible to oxidation and polymerization—form gums, resins, asphaltenes. When this happens, oil becomes tired . . . unable to do its vital job.

Result—piston lacquering, bearing failures, premature engine wear, increased upkeep and excessive oil consumption.

Briggs Oil Clarifiers prevent the disastrous results of tired oil. They remove the visible contaminants in oil . . . dust, metal chips and grit. They remove the invisible products of oxidation . . . gums, resins, asphaltenes. Oil clarified in a Briggs Clarifier does a better job longer, maintenance is lowered, trouble is prevented.

Ask the Briggs Distributor in your locality for the facts about the advantages of continuous maintenance of lube oil, the importance of clean Diesel fuel oil. He will show you how and why Briggs Clarification goes far beyond ordinary filtration.

There is a Briggs Oil Clarifier for every size and type internal combustion engine . . . for every type of oil . . . for practically every purpose.

Consult Briggs FIRST on any filtration problem.

ARMY (E) NAVY

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PIONEERS IN MODERN OIL FILTRATION

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supervision of the operative duties of the president.

CLIFFORD E. ALDEN recently joined the staff of The Foxboro Co., Foxboro, Mass., where he will specialize in instrument application to waterworks, sewage disposal plants, garbage incinerators and similar public works, together with corresponding installations for industrial plants.

After 20 years of sales and engineering experience with prominent companies supplying equipment for public works plants, Mr. Alden joined the War Manpower Commission in 1942 and was connected with the Training Within Industry program in the Philadelphia area. He resigned this post to take his present position with The Foxboro Co.

LEO F. MCCAFFREY has joined the Allis-Chalmers Mfg. Co., Milwaukee, Wis., as an industrial engineering specialist, it was recently announced by P. F. Bauer, manager of the industrial sales department of the general machinery division.

Mr. McCaffrey will head the department's metal industries activities. Prior to joining Allis-Chalmers, he served as assistant works manager in charge of operation at the Algoma Steel Co., in Ontario, Canada. A graduate of Carnegie Institute of Technology, Mr. McCaffrey has been employed by Jones & Laughlin Steel Co., Crucible Steel Co. of Midland, Pa., Weirton Steel Co. of Weirton, W. Va., the Otis Steel Co., Cleveland, Ohio, and the Ford Motor Co. He has also served as a special consultant to the operating vice-president of the Steel Company of Canada.

Donald M. Drake, president and principal owner, has announced that the name of his building construction firm has been changed to the Donald M. Drake Co. Formerly known as Drake, Wyman and Voss, Inc., firm will continue its offices at 904 Lewis Building, Portland, Ore.

THE HEADQUARTERS of the Water and Sewage Works Manufacturers Association, Inc., has been moved from 12 E. 41st St., to 170 Broadway, New York City.

build better RAILROADS

. . . with Ballast from a Cedarapids Master Tandem

Rebuilding the roadbeds of the nation's railroads after the war years' forced neglect will require millions of tons of aggregate. Much of this work must be done in remote sections of the country so that it will be more advantageous to take the crushing plants to the jobs. That's why the portability and high capacity of Cedarapids Master Tandems are so important. With a Cedarapids Primary unit ahead of it, the Master Tandem reduces big rock to uniform ballast size in a continuous flow, smoothly and economically. The entire plant is on wheels and can be moved easily from one job to the next without delay. Every part is designed and built to stand up under the hardest use with only a minimum of maintenance.

Whatever your requirements for aggregate producing or asphalt mixing equipment for tomorrow's construction jobs you'll find your best source of supply in Iowa's complete line. See your local dealer or write.

Cedarapids Built by IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

IOWA MANUFACTURING CO.

Cedar Rapids, Iowa

Deep Digging...

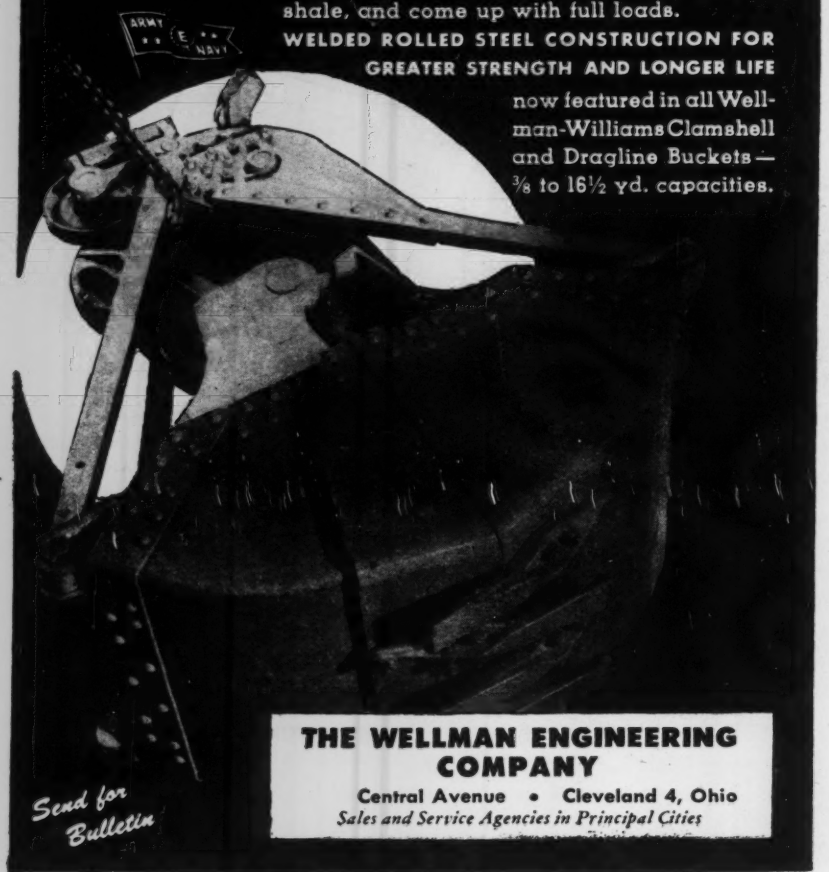
WELLMAN

Williams Buckets

Wellman Buckets, in Power Arm and Multiple Rope Types develop great digging power. They bite into frozen ground, hard clay or shale, and come up with full loads.

WELDED ROLLED STEEL CONSTRUCTION FOR GREATER STRENGTH AND LONGER LIFE

now featured in all Wellman-Williams Clamshell and Dragline Buckets — ⅜ to 16½ yd. capacities.



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Manufacturers' Publications

Halftracks—A bulletin illustrates and gives models and specifications of halftrack vehicles which resemble the conventional truck, except that propulsion is through tracks used in place of rear wheels. They are designed primarily for off-the-highway operation. They obtain traction over terrain impossible to negotiate with wheeled vehicles, and therefore are serviceable on steep grades and over deep mud, snow and ice, and sand and rocks.—*The Linn Mfg. Corp., Morris, N. Y.*

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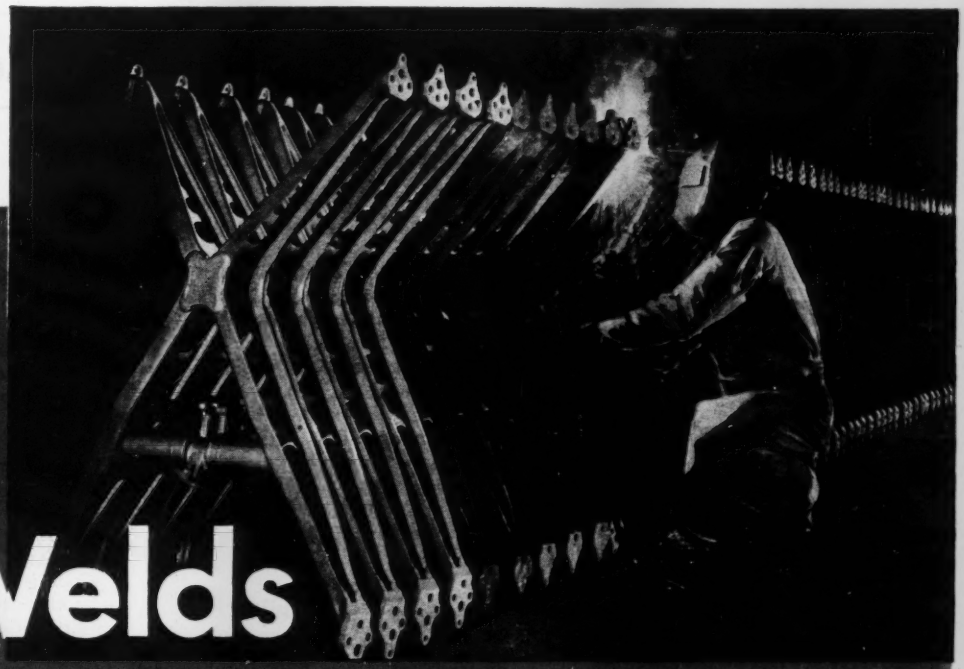
SMITHWAY Electrodes in action—Welding press-formed alloy steel truss members at 13 points assured adequate strength, boosted production and saved materials and finished weight on C-47 landing gear trusses, as compared with former forged steel construction.



13 Welds —BROKE A BOTTLENECK

SAVING 56% in material ... 34% in weight!

WHEN the U. S. Army's vital C-47 cargo plane was ready for mass production, there just wasn't enough drop forge capacity available in the nation to make the landing gear trusses pictured above.

So the part was redesigned for welding with SMITHway electrodes, and the bottleneck disappeared.

In this vital war emergency, welding as a production tool had replaced forgings with stampings, had avoided extensive machining time, had saved 106 pounds per unit of critical alloys, and assured unlimited production speed.

SMITHway Certified Welding Electrodes are vital factors in this and many other modern welding achievements. Now available for your use, too! They are helping win recognition for *welding* as a great production tool . . . as the best method for fabricating most products of steel. Write for catalog . . . and make the most of WELDING!

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Mild Steel . . . High Tensile . . . and Stainless Steel

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made by welders . . . for welders

SMITHway Welding Monitor trains better welders, faster.

SMITHway A. C. Welding Machine saves power; eliminates arc blow.

SMITHway Certified WELDING ELECTRODES

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Wellman Buckets, in Power Arm and Multiple Rope Types develop great digging power. They bite into frozen ground, hard clay or shale, and come up with full loads.

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now featured in all Wellman-Williams Clamshell and Dragline Buckets—
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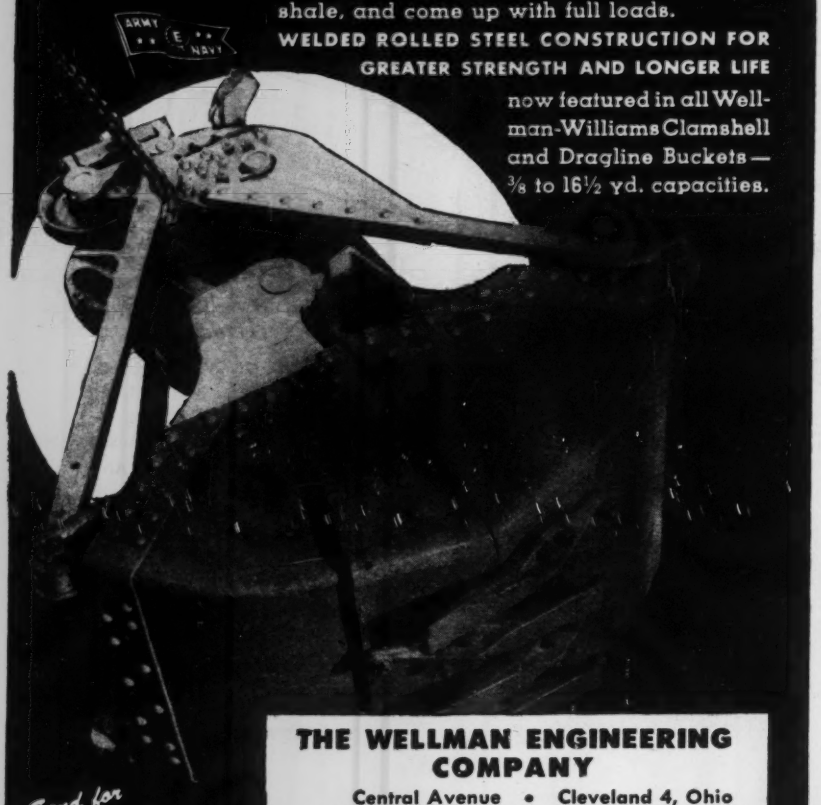

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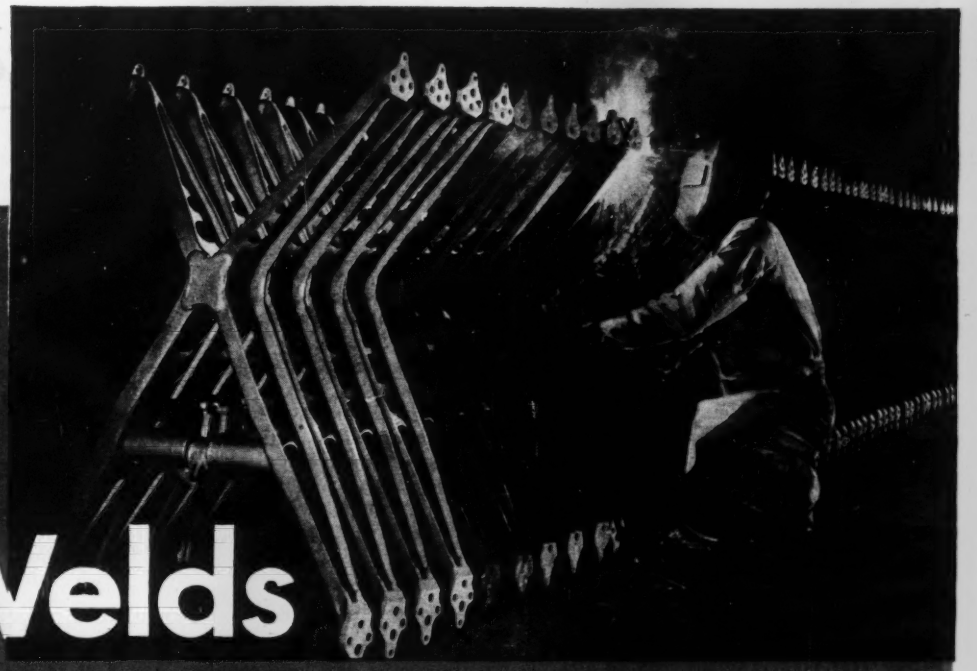

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New Aids to the Constructor

Tubular Snap Gage

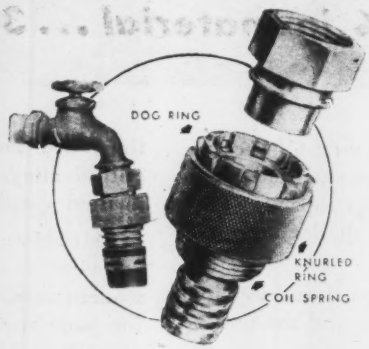
Stressing a high standard of accuracy, a new line of tubular snap gages is available in numerous sizes and in pin or button types. The rigid gage frame is hollow, entirely of steel; because it is light weight, it gives a feather-touch balance.

These gages, it is claimed, resist breakage, will not rust or tarnish, and do not tire the worker. The lustrous chrome finish reflects radiated heat, and the holes for button and block are properly aligned and parallel for easy adjustment.—*Tubular Micrometer Co., St. James, Minn.*

• • •

Hose Coupling

Adaptable for water faucets in industrial use, a new hose coupling may be connected or disconnected quickly, as there are only two moving parts. The device is sealed by a rubber gasket on an inside shoulder. Of durable, light



weight aluminum, this "Direct-Connect" coupling is available in ⅝, ¾ and 1-in. sizes.

In addition to its use on fuel, oxygen, heating and fire extinguisher lines, this compact coupling finds much use in testing operations of air conditioning and hydraulic equipment, metering gages, valves, etc. It fits all standard type AN nipples with the undercut.—*E. B. Wiggins Oil Tool Co., Inc., 3424 West Olympic Blvd., Los Angeles 23, Calif.*

• • •

Strong Adhesive

Non-thermoplastic, water and aromatic oil resistant, a new rubber cement, Plastilock 500, will bond metals, wood, plastics and ceramics to themselves or to each other, the manufacturer states. Best results are obtained by using both heat and pressure, although heat alone will give some degree of adhesion. The bond strength varies with the materials being adhered.

Used for metal-to-metal bonding, the new cement has shown a shear strength of 3,250 lb. per sq. in., tensile strength of 4,000 lb. per sq. in. Wood and plastic bonded to aluminum have torn under test because the bond was stronger than these materials.—*The B. F. Goodrich Co., Akron, Ohio.*

• • •

Electrode Holder

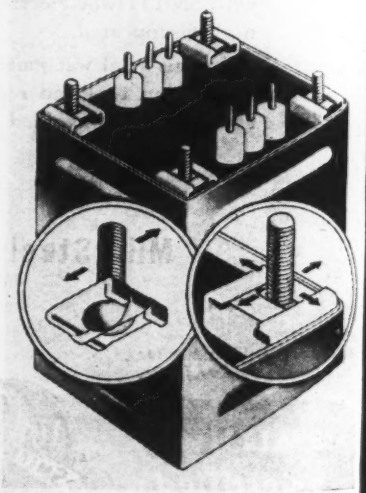
An outstanding feature of the new Mor-Weld electrode holder is its heat-resisting "Everlast" plastic jaw cover, which is said to give very long service. Another feature is the holder's flexibility by which the welding rod may be used down to a mere stub, without bending.

The lever-action jaws can be quickly replaced without tools, and all parts are interchangeable. The plastic, scientifically balanced handle cannot come off by itself. The holder is cool under continuous operation, it is claimed, and can easily be removed from the cable. —*Pacific Engineering Corp., 3123 San Fernando Road, Los Angeles 41, Calif.*

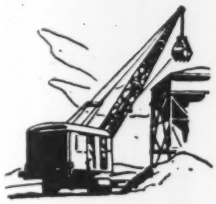
• • •

Transformer Mounting Stud

A novel, practical development in transformer mounting is a self-aligning, detachable stud that allows an actual tolerance of over ¼ in. in mounting



dimension. It is also said to eliminate rejects due to bad threads, leaks, bent or broken studs and changes in length specification.



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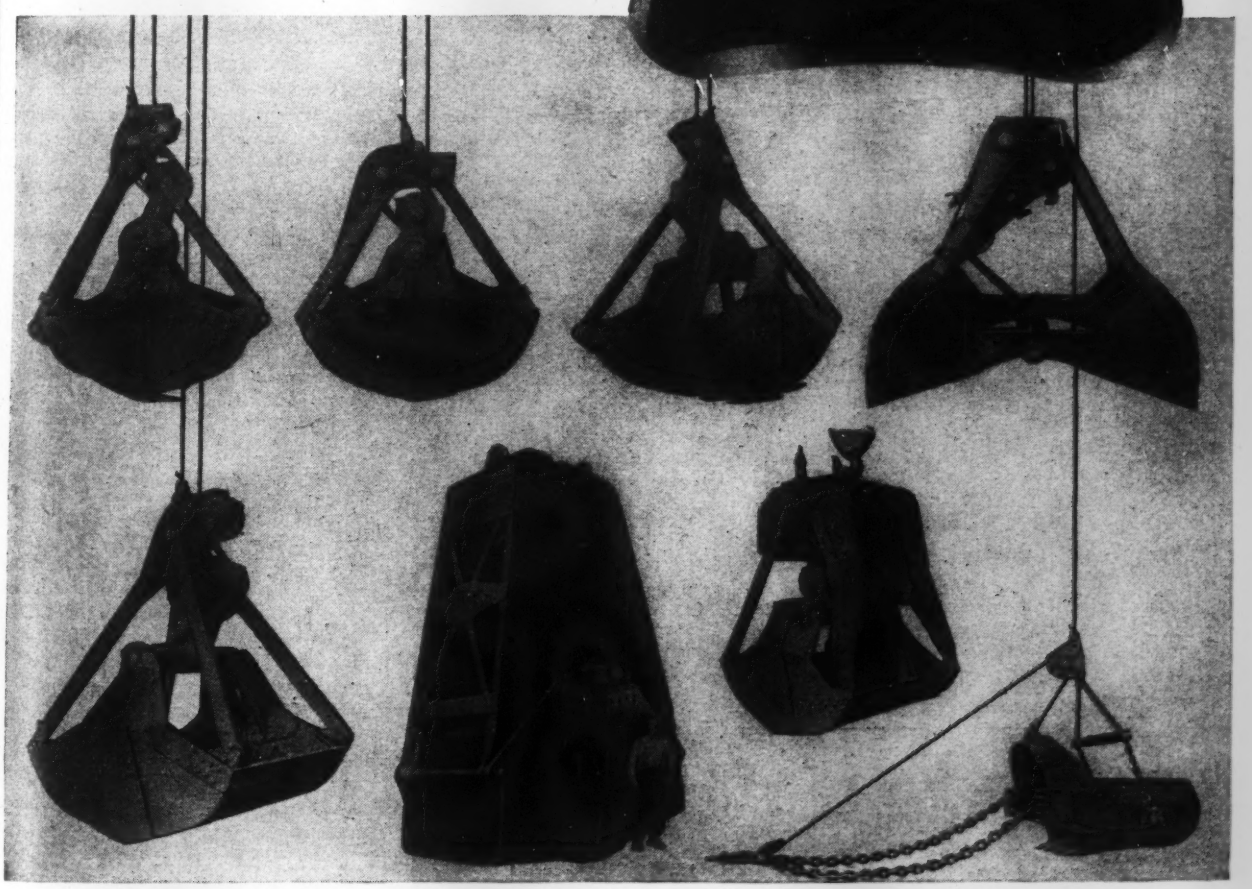

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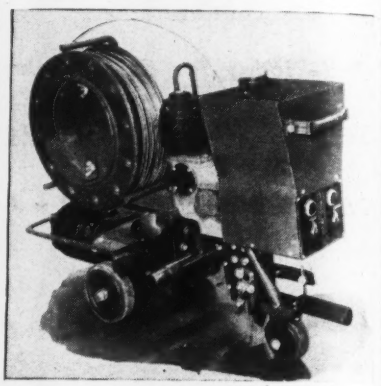
MINNEAPOLIS 13, MINNESOTA

The stud is prevented from turning by a heavy-gage steel, cadmium-plated clip arrangement, which permits centering in two directions. The stud can be moved in four directions to align with irregularly spaced holes.—*Electronic Components Co., 423 N. Western Ave., Los Angeles, Calif.*

• • •

Direct Current Arc-Welding

Particular advantages reported for the new "Lincolnweld" process of arc welding are: One type and grade of flux, with one analysis of electrode, can be used for a wide range of steel analysis; equipment will take $\frac{1}{8}$ to $\frac{3}{32}$-in. electrode without change of drive



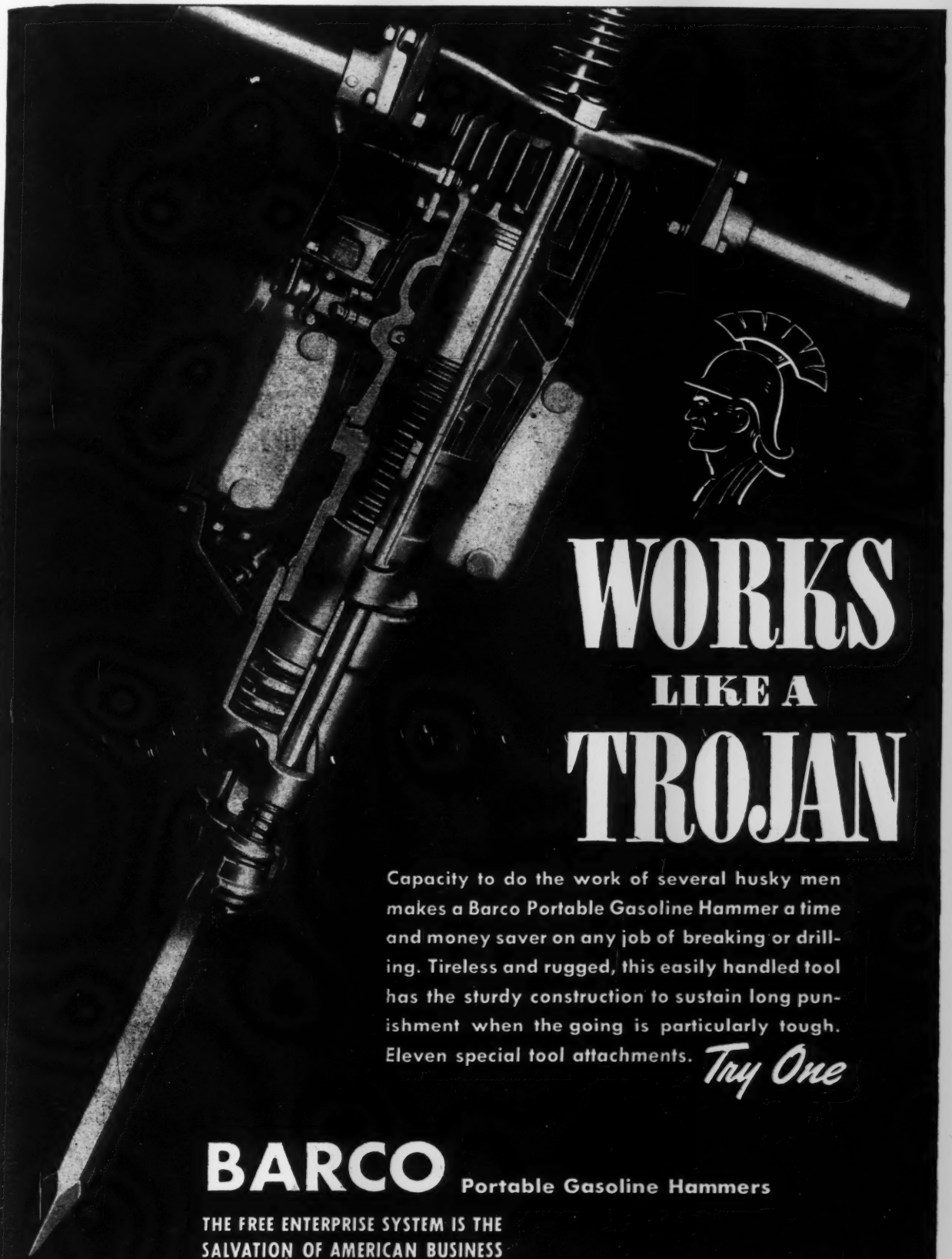
rolls, wire contacts or control; the control is simple and quick acting. This process, for use with direct current, utilizes a bare metallic electrode which is fed through a granular flux deposited on the joint to be welded. Sufficient flux to blanket the arc and the molten metal is applied; unfused flux is reclaimed for further use.

With "Lincolnweld," the welding head is normally used with a specially built automatic set of 1,200 amp. capacity; the current rheostat permits a range of 300 to 1,200 amp.—*The Lincoln Electric Co., Cleveland, Ohio.*

• • •

Dust Collector

Compact enough to fit behind or beside standing machines, a new powerful unit-type dust collector has standard attachments to simplify installation. This 265-lb. unit, measuring 20x20x38 in., develops 500 cu.ft. per min. through two 3-in. dia. inlets by a ¾-hp., 3,450 rpm. motor. The collector's filter consists of 20 layers of viscous coated filter paper. When the filter becomes too dirty to operate efficiently, the first two layers may be peeled off; this can be done five times, it is claimed, without affecting its cleaning ability.—*Ideal Commutator Dresser Co., 1368 Park Ave., Sycamore, Ill.*



WORKS LIKE A TROJAN

Capacity to do the work of several husky men makes a Barco Portable Gasoline Hammer a time and money saver on any job of breaking or drilling. Tireless and rugged, this easily handled tool has the sturdy construction to sustain long punishment when the going is particularly tough. Eleven special tool attachments. *Try One*

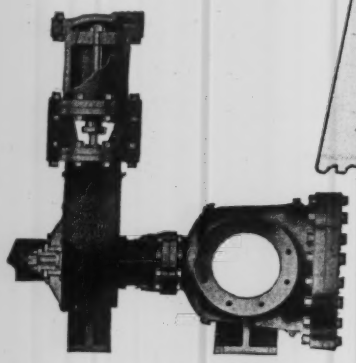
BARCO Portable Gasoline Hammers

THE FREE ENTERPRISE SYSTEM IS THE SALVATION OF AMERICAN BUSINESS

BARCO MANUFACTURING COMPANY, NOT INC., 1814 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd., Montreal, Can.

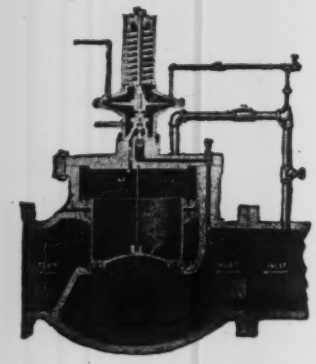
This line is complete...

-VALVES IN TYPES AND SIZES FOR EVERY SERVICE!

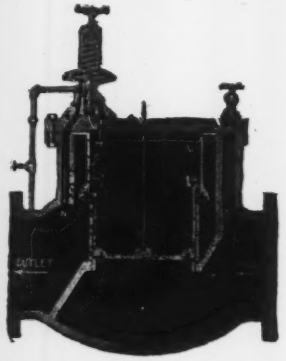


G-A WATER PRESSURE REDUCING VALVES feature a perfectly balanced pilot control, capable of meeting any flow demands. Air and water cushioning assures feather touch operation. These are furnished in sizes from 3 inches to 36 inches, materials to meet your specific needs.

Get a constant automatic water level control that you can rely on! Equip your tanks and standpipes with G-A ALTITUDE CONTROL VALVES. There's no danger of overflow with this valve and it is cushioned against water hammer. These valves are supplied in two inch to thirty six inch sizes, globe or angle patterns with full bronze trim.



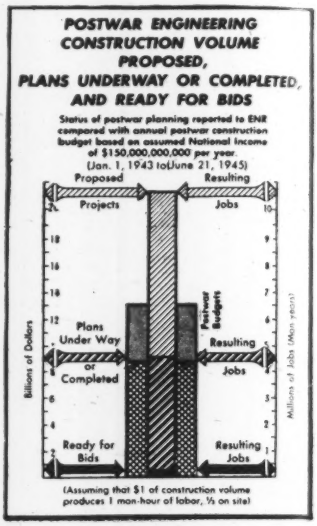
There's no pressure drop on full line openings when G-A CONE THRU-FLOW VALVES are on the job! These units are designed to serve on most automatic services such as altitude, check, relief, etc. In lieu of gate valves these can be supplied for manual operation. Four inch to seventy two inch sizes are available.



Make GOLDEN-ANDERSON your choice regardless of the type of water service. This line is *complete* . . . offers valves in sizes and types to meet almost any requirement. Write for our latest catalog.

GOLDEN-ANDERSON
Valve Specialty Co.
FULTON BLDG.
Pittsburgh, Pa.

POSTWAR PROJECTS


POSTWAR ENGINEERING CONSTRUCTION VOLUME PROPOSED, PLANS UNDERWAY OR COMPLETED, AND READY FOR BIDS
Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year.
(Jan. 1, 1943 to June 21, 1945)
Proposed Projects
Resulting Jobs
Plans Under Way or Completed
Ready for Bids
Postwar Budgets
Billions of Dollars
Millions of Jobs (Man years)
(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to ENGINEERING NEWS-RECORD.

Statistics based on these reports are used by the Committee on Postwar Construction of the American Society of Civil Engineers to measure the progress of plans for postwar projects.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

WATER SUPPLY

PROPOSED WORK

Ind., Brazil—Bd. P. Wks., E. S. Cox, secy., City Hall, WW imprvs., wells, elevated storage tank, mains, electrification steam pump. plant. **$150,000.**

O., Napoleon—Bd. Public Affairs, Napoleon, renewal, addns. of equip. in municipal WW and installation water-softening equip. **$200,000.**

★**Ore., Salem**—City, City Hall, exten. water sys., involving 10 to 15 mi. 6- to 36-in. c.i. pipe, **$650,000.** Financing partially provided. C. Gunther, City Hall, Water Dpt. mgr.

Tex., Cuero—City, J. T. Newman, mayor, plans c.i. watermains. **$25,000.** Financing not provided.

Wash., Ritzville—City, City Hall, 2 m.g. reservoir. **$100,000.** Financing not provided.

Wis., Sussex—Village, M. Hardiman, clk., City Hall, pump. station. **$30,000.** Financing not provided.

PLANS UNDER WAY

Calif., Antioch—City, City Hall, **$425,000** bond election July 10, municipal WW imprvs. incl. new water treatment plant, etc. J. S. Bates, 3134 Eton Ave., Berkeley, consult. engr. CD 4/11—ENR 4/19.

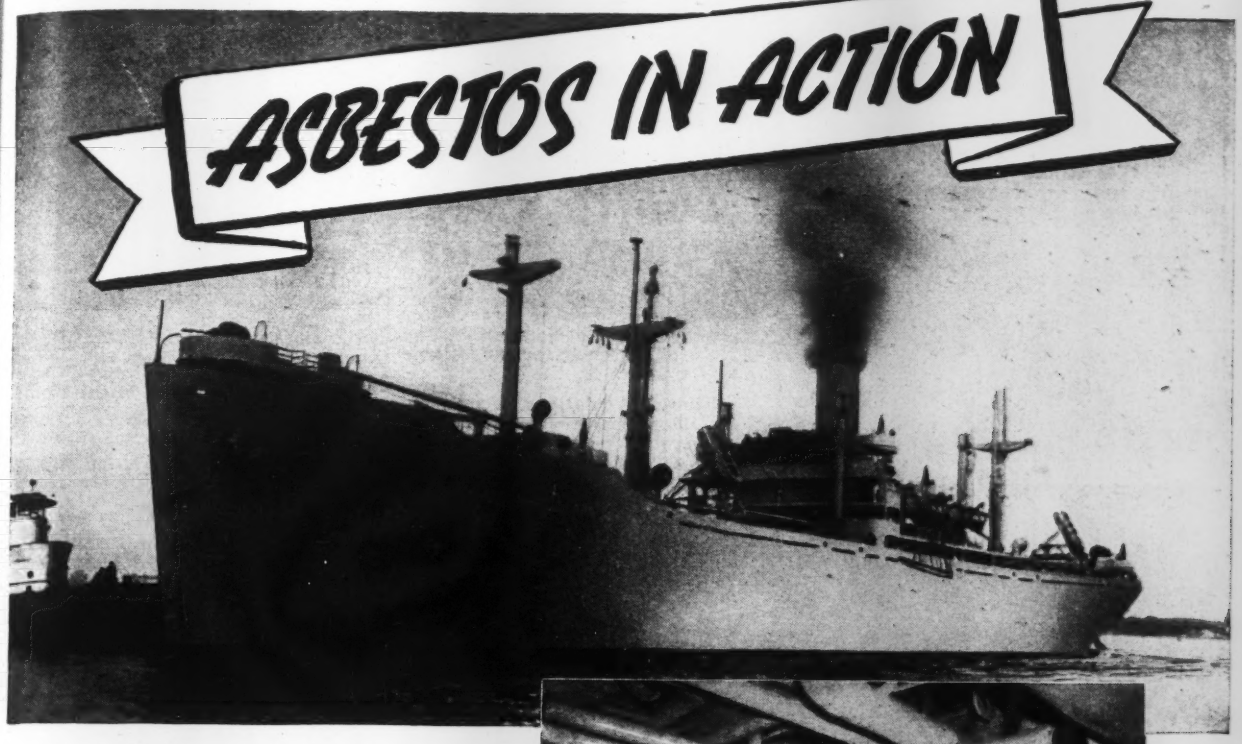
Calif., Sunnyvale—City, City Hall, drilling deep well, constructing 1 m.g. water tank. **$40,000.** Financing not provided. H. S. Bishop, 505 S. Bayview Ave., city engr.

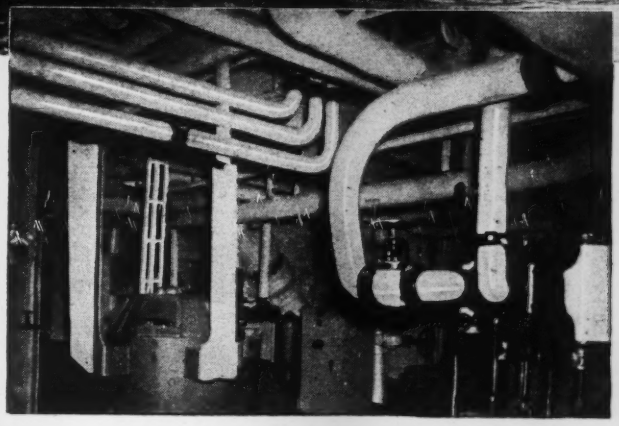
Calif., Tracy—City, City Hall, plans under way imprv. municipal water sys. **$143,000.** Bond election June 26. J. S. Bates, 3134 Eton Ave., Berkeley, city engr.

★**Conn., New Canaan**—City, First Taxing Dist., City Hall, plans underway 80 x 600 ft. rein.-con., reservoir, 600 m.g. capacity. **$600,000.** Financing provided. Buck, Seibert & Jost, 112 E. 19 St., New York, N. Y., consult. engrs. CD 9/20/44—ENR 10/5/44.

Ia., Orange City—City, A. Hasselo, clk., City Hall, retained Buell & Winter, consult. engrs., Sioux City, for survey, wells at Floyd River Valley and piping to city. **$30,000.**

ASBESTOS IN ACTION





Saving precious fuel and steam

K&M "FEATHERWEIGHT" *85% Magnesia*

"Photo Courtesy Armstrong Cork Company"

Every intricate bend of the steam piping to pumps and apparatus in the engine room of this cargo vessel is tailored uniformly with K&M "Featherweight" 85% Magnesia. This widely used pipe covering combines the high insulating properties of basic Carbonate of Magnesia with strong Asbestos Fibres, and is designed for pipes carrying temperatures up to 600° F. It is extremely light in weight and it delivers maximum efficiency.

In one shipyard alone, 250 cargo vessels of the Liberty and faster 16 knot Victory type (pictured above) have been insulated by the skilled coverers of the Armstrong Cork Company, distributors of K&M "Featherweight" 85% Magnesia.

K&M "Featherweight" 85% Magnesia is giving this same kind of dependable service—these same heat and fuel savings—in power plants and industrial process plants all over the country. In fact, from the time 85% Magnesia Insulation was first developed by K&M more than sixty-five years ago, the name "Featherweight" has been a byword for quality with plant operating men.

ARMY E NAVY

K&M best in asbestos

YOUR MERCHANT MARINE SAVED US DURING WAR — LET IT SERVE YOU DURING PEACE

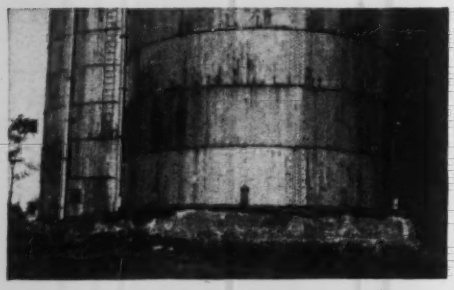
KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



"GUNITE" SAVES FOUNDATIONS

The "before" and "after" photos show two of three water standpipe foundations which we restored last year for the Village of Carthage, N. Y.

These foundations were very seriously disintegrated and in dangerous condition. All loose and deteriorated concrete was chipped away and mesh reinforced "GUNITE" placed 3" to 12" thick to restore the foundations to original dimensions. Extreme care was taken to place "GUNITE" well under the bearing edge of the standpipe.

This work was done under the supervision of Mr. J. Lamprecht, Consulting Engineer, Fayetteville, N. Y.

Our 72-page bulletin A2300 describes scores of uses of "GUNITE". Write for your copy.

MANUFACTURERS OF THE "CEMENT GUN"

BROWNHOIST BUCKETS

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POSTWAR PROJECTS (Cont'd.)

Kan., Topeka—City, F. W. Knapp, clk. City Hall, pump. station in city park, $100,000. W. E. Baltry, City Hall, city engr.

La., Natchitoches—City, City Hall, plans under way water extens. $350,000, bond election June 26.

Minn., North Branch—Village, A. S. Bjorlis, clk., watermains, wells, etc. $75,000. Hitchcock & Estabrook, 521 Sexton Bldg., Minneapolis, consult. engrs.

Minn., Watertown—City, c/o Clerk, City Hall, water supply sys., incl. wells, pumphouse, watermains. $35,000. Toltz, D. Thomas & Assoc., 1200 2nd Ave. S., Minneapolis, consult. engrs.

Okla., Claremore—E. Towner, mayor, City Hall, plans under way WW imprvs. $166,700. Collins Engrg. Co., McAlester, consult. engrs.

Tex., Denton — City, defeated $275,000 bonds water imprvs., pump. unit, supply facilities, storage, etc.; **$100,000** bonds for distr. water lines. Plans new bond election. J. E. Ward, Harvey-Snider Bldg., Wichita Falls, consult. engr. CD 6/4—ENR 6/14.

Tex., Honey Springs (Mail Dallas)—Eugene Bradshaw & Assoc., Honey Springs, plans 50% completed water sys., $40,000. Financing provided.

Wash., Kelso—City, H. C. Kling, mayor, City Hall, rebuild, expand water sys. $400,000. Financing provided. G. H. Brown, City Hall, city engr.

Wis., Waukesha—Water Utility Comm., Waukesha, plans under way water distr. sys. $50,000. Financing provided. W. E. Dick, City Hall, engr. CD 2/14—ENR 2/15.

READY FOR BIDS

Wis., Berlin—City, B. Brota, clk., City Hall, plans completed water softening plant, $15,000. Financing provided. Foth, Boyd & Porath, Green Bay, consult. engrs.

Wis., Fort Atkinson—City, City Hall, plans completed water distr. sys. $30,000. Financing provided. E. F. Klement, City Hall, city engr. CD 6/16/44—ENR 7/13/44.

PROJECTS CANCELLED

Tex., San Antonio—City, Water Bd., 106 W. Market St., San Antonio, project cancelled 10 in. c.i. feeder line supplying elevated storage tank, $40,000. CD 9/7/44—ENR 9/21/44.

ADVANCED TO ACTIVE STATUS

Ark., Siloam Springs—City, City Hall, project cancelled imprv. WW sys. $200,000. Work now going ahead. CD 11/21—ENR 12/14.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., San Leandro—City, City Hall, Davis St. sanitary sewer, $40,000. Davis St. storm sewer, $70,000. Financing not provided.

Tex., Alamo—Town, L. Johnson, mayor, sanitary sewers, $80,000; drainage and street imprvs., $25,000. Financing not provided.

Tex., College Station—City, S. B. Cook, mayor, City Hall, sanitary sewerage sys. $387,000. Financing not provided.

Tex., Cuero—City, J. T. Newman, mayor, storm sewers, $25,000; sewage disposal plant, $35,000; sanitary sewer lines, $25,000. Financing not provided.

Tex., Graford—City, sanitary sewerage sys. $25,000. Financing provided.

★ **Tex., Tyler**—City, W. H. Knight, mayor, City Hall, storm sewers, $1,000,000. Financing not provided.

Wis., Pittsville—City, E. Knapp, clk., City Hall, storm sewers. $50,000. Financing not provided.

Wis., Sheldon—Village, E. Sanford, clk., City Hall, sewers. $30,000. Financing not provided.

PLANS UNDER WAY

Calif., Sunnyvale—City, City Hall, sanitary sewer extens., $40,000. Financing not provided. H. N. Bishop, 505 S. Bayview Ave., engr.

Calif., Tracy—City, City Hall, plans under way sanitary sewer imprvs., $228,000; industrial sewer facilities, $68,700. Bond election June 26. J. S. Bates, 3134 Eton Ave., Berkeley, city engr.

Ia., Oelwein—City, H. J. Finders, clk., City Hall, plans under way sewage disposal plant. $25,000. E. E. Schenk, City Hall, city engr. CD 1/7—ENR 1/27.

La., Gonzales—Town Council, J. Paul Bourgeois, mayor, City Hall, plans under way sewage collection and disposal sys. $60,000. Barnard & Burk, Triad Bldg., Baton Rouge, consult. engrs.

La., Natchitoches—City, City Hall, plans under way sanitary sewer line extens., $85,000; disposal unit, $40,000. Bond election June 26, for same.

This RUST Prevention Program may save you $10,000 too!

Manufacturer salvages 12,000 Ballistic Dies . . . protects further production with ANTI-CORRODE

A complete plant rust-prevention program is certain to insure operating economy and accelerate production. Backed by a complete line of tested Anti-Corrodes for every industry, Cities Service engineers are prepared to study *your* rust problems and recommend a specific plan to eliminate them.

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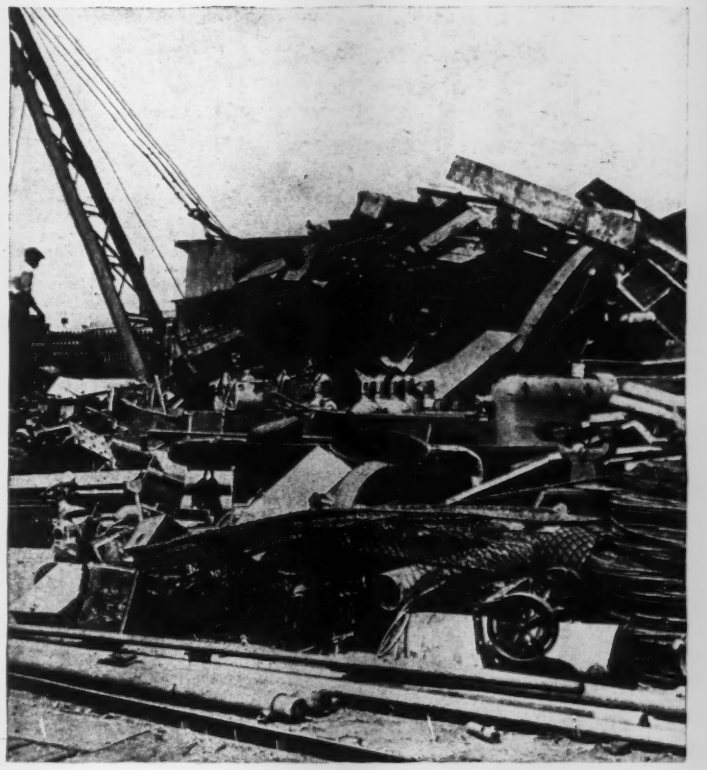

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POSTWAR PROJECTS (Cont'd.)

La., Opelousas—T. W. Huntington, mayor, City Hall, sewers, **$251,220**; drainage sys., **$114,452.** Barnard & Burk, Triad Bldg., Baton Rouge, consult. engrs.

★**Mass., Boston**—City, Dpt. P. Wks., City Hall Annex, plans under way incinerator, Albany St. **$700,000.** Coffin & Richardson, Inc., 68 Devonshire St., consult. engr. CD 3/14—ENR 4/5.

Mass., Worcester—City, Sewer Dpt., City Hall, preliminary plans under way sewer lines in Apricot St. and Wildwood Ave. To exceed **$25,000.**

Minn., Moorhead—City, R. G. Price, clk., storm water drainage sys. **$383,000.** W. C. Hogenson, Moorhead, consult. engr. CD 4/24/44—ENR 6/1/44.

N. H., Laconia—State, Concord, plans under way rebuilding sewage disposal plant, **$29,500.** Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., consult. engrs. CD 11/15—ENR 11/30.

N. C., Charlotte—City, R. W. Flack, mgr., City Hall, plans under way sewage disposal exten. **$100,000.** J. N. Pease & Co., Johnston Bldg., consult. engrs. CD 11/17—ENR 11/30.

O., Fremont—City, City Hall, plans under way trunk sewer line, **$125,000.** Legal obstacles to be overcome. C. Hochendel, Municipal Bldg., city engr. CD 1/17—ENR 2/8.

Okla., Claremore—E. Towner, mayor, City Hall, sewage disposal plant, **$126,880.** Financing not provided. Collins Engrg. Co., McAlester, consult. engr.

Pa., Annville—Annville Twp., Annville, plans under way sewage disposal plant, sanitary sewers. **$350,000.** Wm. A. Goff, Broad Street Station Bldg., Phila., consult. engrs.

Tex., Alamo—City, c/o L. Johnson, mayor, preparing preliminary plans, sanitary sewers. **$80,000.**

Tex., Denton — City, defeated **$275,000** bonds, sanitary sewerage sys. expansion, imprvs.; defeated **$100,000** bonds, storm sewers. Plans new bond election soon. J. E. Ward, Harvey-Snider Bldg., Wichita Falls, consult. engr. CD 6/4—ENR 6/14.

Tex., Texas City—E. A. Johnson, mayor, Texas City, plans under way sewage treatment plant. **$108,000.** J. J. Rady, Insurance Bldg., Fort Worth, consult. engr.

Tex., Waco—City, plans 25% completed storm sewers. **$136,000.** Financing not provided. J. J. Rady, Insurance Bldg., Fort Worth, consult. engr.

Tex., Waco—City, Col. W. C. Torrence, mgr., City Hall, plans under way sewage disposal plant **$200,000.** Financing not provided. J. J. Rady, Insurance Bldg., Fort Worth, consult. engr.

★**Wash., Seattle**—City, County-City Bldg., 3 and James Sts., Zone 4, exten., imprv. sewerage sys., incl. 4 trunk sewers for White Center Dist., Tidelands Industrial Area and Northeast Seattle. **$4,000,000.** Financing not provided. C. L. Wartelle, County-City Bldg., city engr.

Wis., Berlin—City, B. Grota, clk., City Hall, plans completed sewage disposal plant, **$90,000**; sanitary sewers, **$5,000.** Financing not provided. Foth, Boyd & Porath, Green Bay, consult. engrs. CD 6/16/44—ENR 7/13/44.

READY FOR BIDS

Tex., West Columbia—Town, W. H. Pierce, mayor, City Hall, plans completed sewage treatment plant, **$40,000.** Financing provided. S. A. Russell, May City, consult. engr. CD 6/4—ENR 6/14.

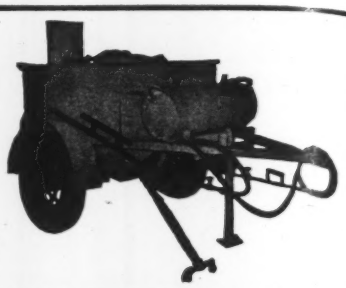
Wash., Chelan—Town, R. M. Pickett, mgr., Town Hall, plans completed sanitary sewerage sys., disposal plant, **$100,000.** Financing provided. C. D. Hall, Larson Bldg., Yakima, consult. engrs.

Wis., Kaukauna—City, K. E. Morzahl, clk., City Hall, plans completed storm sewers, **$35,000**; disposal plant imprvs. **$20,000.** Financing provided. F. M. Charlesworth, City Hall, city engr. CD 6/16/44—ENR 7/13/44.

Wis., Rhinelander—City, C. M. Wardell, mgr., City Hall, plans completed incinerator, **$30,000.** Financing provided. Greeley & Hansen, 6 N. Michigan Ave., Chicago, Ill., consult. engrs. CD 6/13—ENR 7/27.

Wis., Stevens Point—City, A. L. Jacoboski, comptroller, City Hall, plans completed sanitary sewers, **$42,540**; storm sewers, **$40,000.** Financing provided. B. Fieve, City Hall, city engr. CD 1/14/44—ENR 1/27/44.

Wis., Wauwatosa—Town, 7701 Menomonee River Dr., Zone 13, plans completed, sanitary sewerage sys. exten. **$85,343.** Financing provided. Steinhagen & Steinhagen, 2735 W. State St., Milwaukee, Zone 8, engrs. CD 2/8—ENR 2/22.



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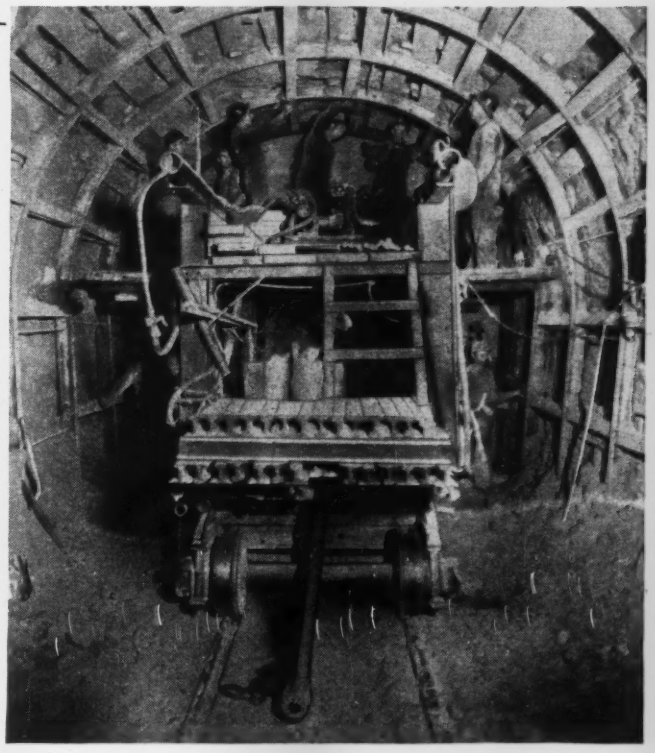
..with Gardner-Denver Tunnel Drills...



They're at the head of the class when it comes to advancing headings, these Gardner-Denver Continuous Feed Drifting Drills. They drill out the rounds in the shortest possible time . . . keep pushing the headings forward *fast.*

The Continuous Feed principle of Gardner-Denver Drifters assures maximum drilling speed in any type ground. The drill is automatically fed to suit the ground. With feed throttle set for the ground, the rest is automatic . . . the drill will advance as fast as the bit penetrates. The type of ground being drilled actually regulates the speed of the feed . . . the pressure of the feed remains constant for a given throttle setting.

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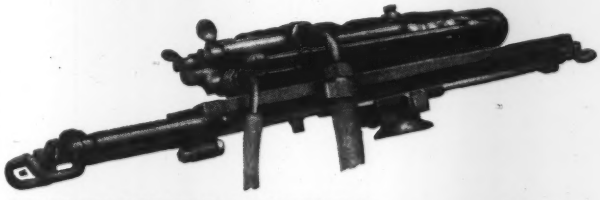

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BRIDGES

PROPOSED WORK

★**Tex., Tyler**—City, W. H. Knight, mayor, preliminary surveys, steel, concrete, wooden bridges, culverts, **$950,000**; grade separations, **$650,000**. Financing not provided.

PLANS UNDER WAY

★**Florida**—Port Authority of St. Petersburg, St. Petersburg, plans under way 12 mi. bridge over Tampa Bay from Terra Ceia Bay from Maximo Point, Pinellas Peninsula, Pinelles Co. to Sned Island, Manatee Co. **$10,000,000.** Financing not provided. Bail, Horton & Assoc., Ft. Myers, Fla., and Parsons, Brinckerhoff, Hogan & Macdonald, 142 Malden Lane, New York, N. Y., engrs. E. L. Cole, c/o owner, engrs.

Missouri—State Hy. Comn., Jefferson City, plans 90% completed three 35 ft. I-Beam span bridge, concrete pile bents over North Cut Drainage Ditch, road from St. Johns Drainage Ditch, Route 60, Proj. F [illegible]-(4), Scott Co., **$22,300;** one 70 ft. and three 35 ft., 1-Beam span bridge, 3 concrete bents to rock, 2 creosoted pile bents over South Fork of North River, Route SZ Proj. S PW-FAS 830 (4), **$18,000;** two 10 ft. rein.-con. slab span, culvert type bridge, over Outer Wood Fork, from Rt. SC South to Rt. 34, Route SZ Proj. SPW-FAS 830(4), $3,600, both Marion Co., two 13 ft., rein.-con. slab span, culvert type bridge over High Point Branch from Morgan Co. line to Cole Co. line, Route SC-Proj. SPW-FAS 139 (1), **$3,600;** two 10 ft. rein.-con., slab span culvert type bridge over Simpson Bridge, from Morgan Co. line to Cole Co. line, Route SC Proj. SPW-FAS 139 (1), both Moniteau Co. C. W. Brown, ch. engr.

★**Okla., Wewoka**—Seminole Co., Wewoka, bridge and culvert project, **$1,000,000.** G. Sweatt, Box 756, asst. co. engr.

ADVANCED TO ACTIVE STATUS

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, project cancelled, bridge approaches, Agawam and West Springfield. Work now going ahead. CD 7/6—ENR 7/[illegible]

STREETS AND ROADS

PROPOSED WORK

Tex., College Station—Town, S. B. Cook, mayor, surveys 1% completed street paving, **$90,000.** Financing not provided.

Tex., Cuero—City, J. T. Newman, mayor, street paving, imprvs., concrete curbing, gutters. **$100,000.** Financing not provided for.

★**Tex., Galveston**—Galveston Co., [illegible] Judge, Courthouse Bldg. integrated system mainland roads. **$1,500,000.** Financing not provided.

PLANS UNDER WAY

★**Missouri**—State Hy. Dpt., Jefferson City, plans 90% completed graded earth and surfacing 5.699 mi. Route F from Rt. [illegible] south thru Jack to Rt. E, **$57,300;** 4.9 mi. Route C, from Route 72 west to Anna, **$37,700,** both Dent Co.; 5.47 mi. Route T from Route 60 southwest to Chilton, **$33,200;** 4.5 mi. Route E, from Rt. 29 at Hunter West, **$25,000,** both Carter Co.; 4.49 mi. Route B, from end of present construction at Northview South, **$54,000;** 6.349 mi. Route W, from Bench southeast to Rt. [illegible] to Marshfield, **$65,000,** both Webster Co.; 4 mi. Route M, from Route SC southwest to Cedar Creek, **$28,700;** 7.562 mi. Route F, from Route 76 near Walnut Shade southwest to Rt. 65, **$75,000,** both Taney Co.; 7.897 mi. Route A, from end of present construction southeast to Rt. 44, Stone Co., **$32,200;** 5.7 mi. Route BB, from Route AA south to Route B near St. John, **$30,000;** 10.1 mi. Route AA from Route 17 at Crocker Northwest thru Hawkeye to Millet Co., **$37,000,** both Pulaski Co.; 4.2 mi. Route M, from Rt. 13 at Brighton east to Pleasant Hope, **$27,000;** 6.25 mi. Route C, from Rt. D east thru Rimley to Dallas Co., $60,000; 1.434 mi. Route H from Pomdeade Terre River gap north of Pleasant Hope, $42,000, all foregoing Polk Co.; 4 mi. Route F, from Rt. 72 southeast to Rt. H, near Winkler, **$47,000;** 0.284 mi. Route H, from Dry Fork Creek and between St. James and Rt. A, **$85,000,** both Phelps Co.; 2.304 mi. Route Y, from Peace Mill east to Route E, $30,000; 4.302 mi. Route O, from Route B west, **$53,000,** both Laclede Co.; 5.804 mi. Route E, from Weanbleau south to Polk Co., **$56,000;** 5.113 Route P, Route 65 at Cross Timbers east to Jordon, **$25,000,** both Hickory Co.; 6 mi. Route F, from Route 65 south to Route 14, **$32,600;** 3.123 mi. Route K, from present construction south to Route D (James River Gap), **$30,000;** 6.592 mi. Route OO, from Rt. H east to Rt. 65, **$87,000,** all foregoing Greene Co.; 2.502 mi. Route P, from Route K south to W.P.A. improvements, Dallas Co., **$31,000;** 4.711 mi.

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Utter destruction of the enemy is "top production" in the battle zones. That's a job requiring the **best** in men and equipment — getting there first with the most is no longer enough.

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Hard, on-the-job experience proves the many practical advantages of Johnson Clamshell Buckets — they dig cleaner and faster and last longer. Renewable lip edge-bar of tough manganese steel reduces wear and is readily replaced in the field.

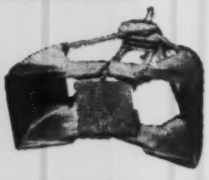
Absence of power-wasting rivets and bolts streamlines digging action. The shell is shaped to fill quickly and easily with a minimum of lifting action. The result is better balance and improved digging quality in all types of material.

Needle-bearing mounted closing sheaves, sealed against dirt and moisture, give free-running cable action at all times.

Cable wear is greatly reduced by guide sheaves which replace ordinary crossrollers. Lower sheaves are protected by extra heavy steel plates.

General purpose type ½ to 2 yard capacity in stock for immediate delivery to contractors with required government authorization.

Johnson Clamshell Bucket showing manganese steel teeth designed for smooth, speedy digging.



Johnson Bucket in open position showing heavy shock-preventing protection plate for lower sheave assembly.

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POSTWAR PROJECTS (Cont'd.)

Route C, from Finley River southeast to Sparta, Christian Co., **$25,000**; 6 mi. Route P, from Route 71 of Arthur west, **$36,000**; 1.99 mi. Route B, from present construction to Cedar Co., **$41,000**; 7.3 mi. Route M, from present construction northeast thru Ketterman, **$60,000**, all foregoing Vernon Co.; 7 mi. Route E, from present construction north of Mortegan Springs, **$28,000**; 4.17 mi. Route T, from Guster east to Hickory Co., **$43,400**; 4.894 mi. Route N, from Corbin east to Harper near Hickory Co. line, **$27,000**; 6.153 mi. Route H, from present construction at Taberville south to Rt. 32, **$52,900**, all foregoing St. Clair Co.; 5.5 mi. Route Y, from Rt. 60 east of Seneca south to McDonald Co., **$25,000**; 6.5 mi. Route K, from Racine east to Route 71, **$30,000**; 2 mi. Route W, from Rt. 60 north to Ritchey, **$45,000**; 10.7 mi. road from Stella north to Route 66, **$25,000**; 3.593 mi. Rt. K, from northeast of Seneca northeast to Racine, **$25,000**, all foregoing Newton Co.; 4.176 mi. Route P from Route 71 at Noel east, **$38,000**; 1.023 mi. Route E, from Powell south (completes Route), **$30,000**; 1.647 mi. Route E, from south of Powell south to present construction, **$50,500**, all foregoing McDonald Co.; 5.117 mi. Route O, from Rt. 14 north to Rt. 66 at Halltown, **$25,000**; 4.566 mi. Route T, from Rt. 60 and 13 at McKingley north to Route 14, **$25,000**, both Lawrence Co.; graded earth, state base, bituminous surfacing 3.914 mi. Route J, from Route 60 south to Rt. 13 at Stone Co. line, Christian Co., **$90,500**; graded earth and concrete paving 1.356 mi. Route O, from Route 160 west to Springfield Airport, **$99,200**; 3.002 mi. Route B(23), from Route 60 in Springfield south to Rt. M, **$135,000**, both Greene Co. C. W. Brown, Jefferson City, ch. engr.

Tex., Plainview—City, City Hall, plans 25% completed street imprvs., concrete curbing and gutter, caliche base, 2-course, inv. pen. topping, etc. **$150,000.** Financing not provided. W. J. and B. Williams, P.O. Box 1272, consult. engr. CD 2/12—ENR 2/22.

Wash., Chelan—Town, R. M. Pickett, mgr., Town Hall, plans completed grading, paving, surfacing streets, with curbs, sidewalk and lighting sys. **$400,000.** Financing not provided. G. D. Hall, Larson Bldg., Yakima, consult engr.

Wis., Berlin—City, B. Grota, clk., City Hall, plans completed pavements. **$60,000.** Financing not provided. Foth, Boyd & Porath, Green Bay, consult. engrs.

Wis., Fort Atkinson—City, City Hall, plans completed curb and gutter. **$68,500.** Financing not provided. E. F. Klement, engr.

Alaska, Juneau—City, City Hall, plans under way paving 75,000 sq. yd. streets, **$75,000**; pedestrian tunnel, **$26,000**; 5,000 lin. ft. 4 ft. concrete sidewalks, **$10,000.** Financing not provided. J. L. McNamara, City Hall, city engr.

READY FOR BIDS

Wash., Newport—Pend Oreille Co., Court House, plans completed constructing 34 mi. road, **$289,790**; low-type bituminous surfacing 37.5 mi. road, **$143,039.** Financing provided. C. W. Carter, Court House, co. engr.

Wis., Fort Atkinson—City, City Hall, plans completed grading streets. **$31,500.** Financing provided. E. F. Klement, City Hall, city engr. CD 6/16/44—ENR 7/13/44.

Wis., Kaukauna—City, K. E. Morzahl, clk., City Hall, plans completed curb and gutter, **$18,000**; pavements, **$30,000.** Financing provided. F. M. Charlesworth, City Hall, city engr. CD 6/16/44—ENR 7/13/44.

EARTHWORK, WATERWAYS

PROPOSED WORK

New York—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, protection state-owned Lake George Islands, Warren Co., consisting placing protective stone, riprap and fill preventing erosion, for Div. Lands & Forests, Dpt. Conservation. **$38,164.**

★ †**Ore., Astoria**—U. S. Eng., 628 Pittock Block, SW 10 Ave. and Washington St., Portland, Zone 5, small boat harbor and yacht refuge, exten. harbor 400 ft. channelward of proposed line of outer breakwater, etc. **$1,000,000.** Financing not provided.

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Napa—Napa School Dist., Napa, voted $425,000 bonds, school bldgs.

Calif., Petaluma—Petaluma School Dist., Fair St., Petaluma, voted bonds, gymnasium, swimming pool new manual training and automobile repair bldg. **$476,000.** CD 5/16—ENR 5/24.

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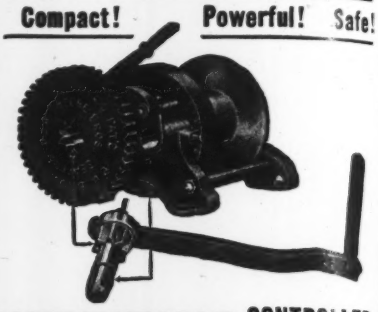

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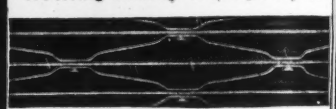

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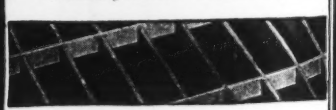
Walkways — Stair Steps — Platforms
Trucking Aisles — Trench Covers



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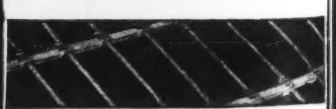

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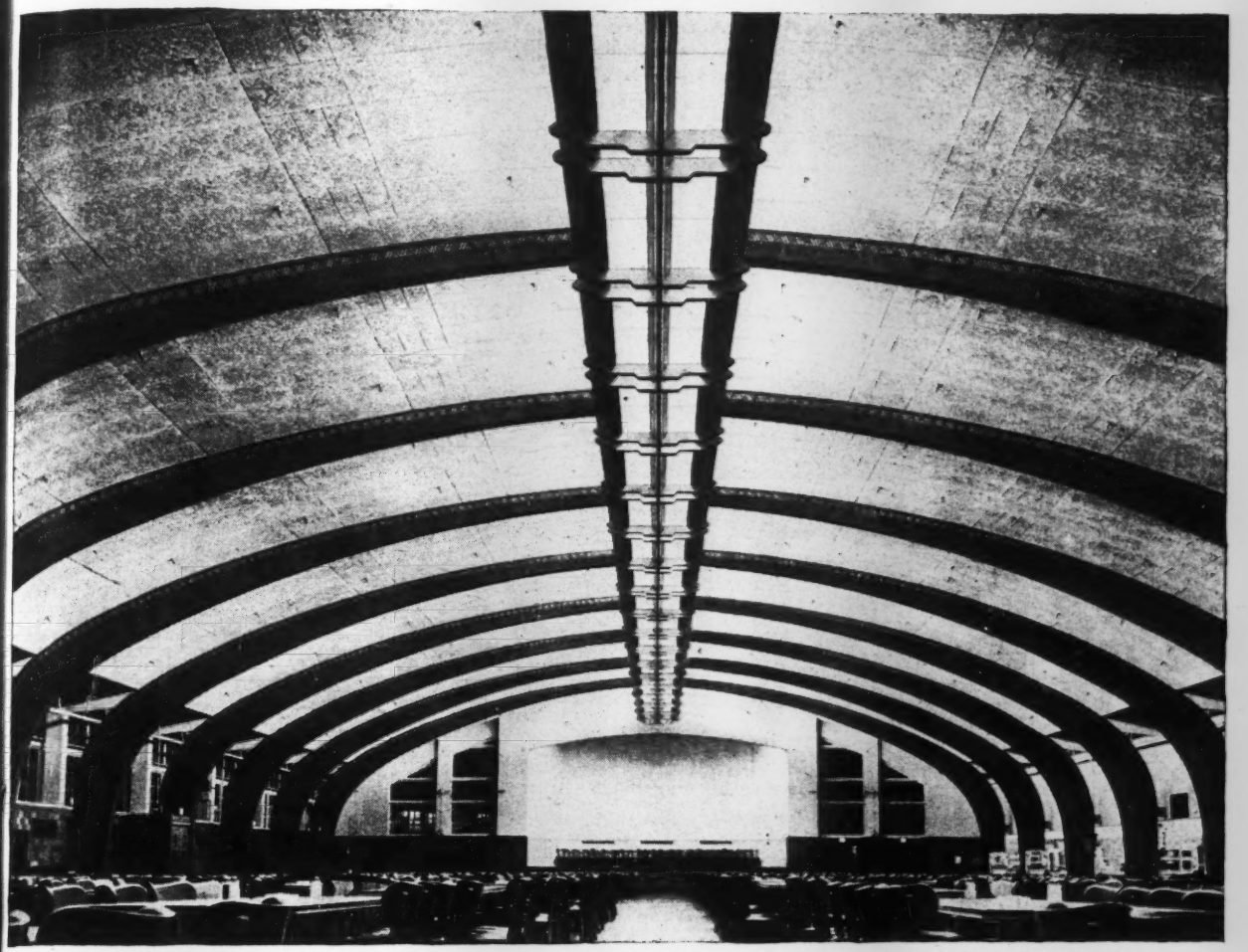

Cafeteria building (95' x 220') of Boeing Aircraft Co., Seattle, Washington. Laminated arches (12) fabricated by Timber Structures, Inc. Arch span is 92' 4"; 28' 3½" clear rise. Built up from 1" x 12" lumber, arches have 37 laminae at base; 56 laminae at knee; 19 laminae at crown. Engineer and designer: The Austin Company. Contractor: Western Construction Co.

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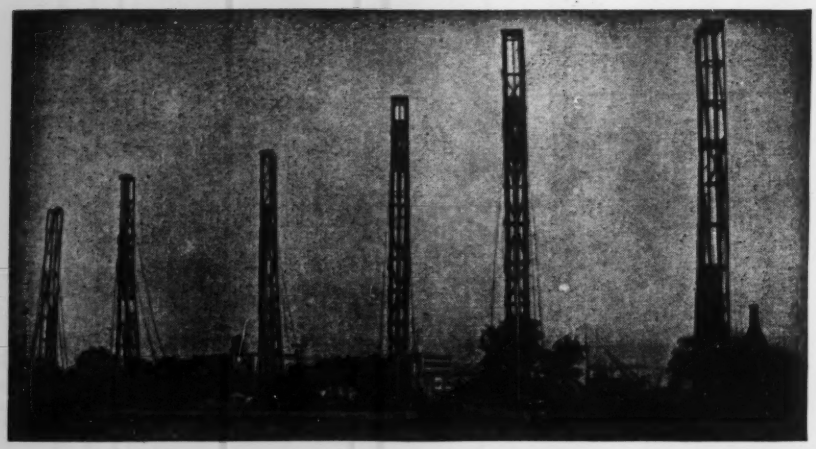

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POSTWAR PROJECTS (Cont'd.)

★**Conn., Hartford**—City Bd. Edu[c] of Schools, F. D. Wish, Jr., 249 [H]igh St., high school addn., housing auditor[i]um, offices, class rooms, laboratories, [c]afeteria, kitchen, swimming pool, Farming[ton] Ave. and athletic field, Hopkins St., $500,000; constructing 2 wings, Weaver High School, one with 40 rooms incl. 3 shops, [m]usic and art rooms, gymnasium wing addn., [s]mall gymnasiums, swimming pool, over $150,000. Financing not provided.

★**Ill., Chicago**—City, City Hall, voted $2,000,000 bonds, police and fire stations, $500,000 bonds city garages. CD 4/[1]5—ENR 5/3.

★**Ind., Logansport**—Logansport State Hospital, Dr. C. L. Williams, supt., [t]uberculosis hospital, **$450,000;** assembly hall, **$350,000;** women's ward bldg., **$275,000;** store room and equip., **$267,000;** power house addns., imprvs., **$150,000;** rein.-con. tunnsys., **$208,000;** sewage treatment plant, **$120,000.** Financing not provided.

Ia., Glenwood—City, P. H. Cheyney, clk. City Hall, **$249,000** bond election July 3, municipal light plant.

Mass., Amherst—Commonwealth of Massachusetts, R. Hawley, treas. State College, Amherst, 2 new dormitories at State College. To exceed **$150,000.**

Mass., Gloucester—City, Mayor's Office, City Hall, garage. **$40,000.**

Mass., North Adams—City, C. E. O'Brien, mayor, City Hall, school. To exceed **$150,000.**

Mass., Randolph—Town, Bd. Selectmen, Town Hall, concrete, brick recreational bldg., incl. gym., auditorium, game room, swimming pool. To exceed **$150,000.**

Mass., Webster—Town, T. R. Lebouef, chn. Bldg. Comn., Town Hall, memorial bldg. for World War II Veterans. $200,000.

Mass., Worcester—City, Supt. Schools, 42 Main St., expan. Girls' Trade School, 56 Chatham St. To exceed **$150,000.** Land purchased.

Minn., Moorhead—City, R. G. Price, clk. Water & Light Dpt., G. Duenst, supt., expan. municipal electric light plant, incl. boiler, 3,000 kw. turbine generator and auxiliary equip. **$112,000.**

O., Toledo—City Health Dpt., 9 Ontario St., Toledo, health center. **$200,000** or more.

†**Okla., Oklahoma City**—Federal Works Agency, 18 and F Sts. N.W., Wash., D. C., post office addn. **$250,000.** Land rights not cleared, financing not provided.

★**S. C., Greenville**—City, C. F. McCullough, mayor, City Hall, memorial auditorium. **$600,000.**

Tex., Albany—City, c/o R. Matthews, hospital. **$150,000.** Financing not provided.

★**Tex., Austin**—State Bd. Control, Austin, home for dependent negro girls, **$1,500,000.** Financing not provided. CD 2/[2]5—ENR 4/5.

Tex., El Paso—City, c/o J. E. Anderson, police station and jail. **$160,000.** Financing not provided.

Tex., Houston—Aldine Ind. School Dist., L. C. Courtney, Aldine-Westfield Rd., sketches underway high school and auditorium bldg., **$150,000;** school, auditorium, cafeteria, **$150,000.** Financing not provided.

Tex., Tyler—City, W. H. Knight, mayor, City Hall, sketches under way fire station, **$250,000.** Financing not provided.

Wash., Anacortes—School Dist., Anacortes, school. **$230,000.** Financing not provided.

Wash., Blaine—School Dist., Blaine, school, **$250,000.** Financing not provided.

Wash., Concrete — Consolidated School Dist. 102, Concrete, auditorium and gymnasium bldg., **$115,000;** vocational bldg., **$45,000.** Financing not provided.

Wash., LaConner—School Dist., LaConner, farm shop, **$40,000.** Financing not provided.

Wash., Maple Falls—Kendall School Dist., Maple Falls, school. **$150,000.** Financing not provided.

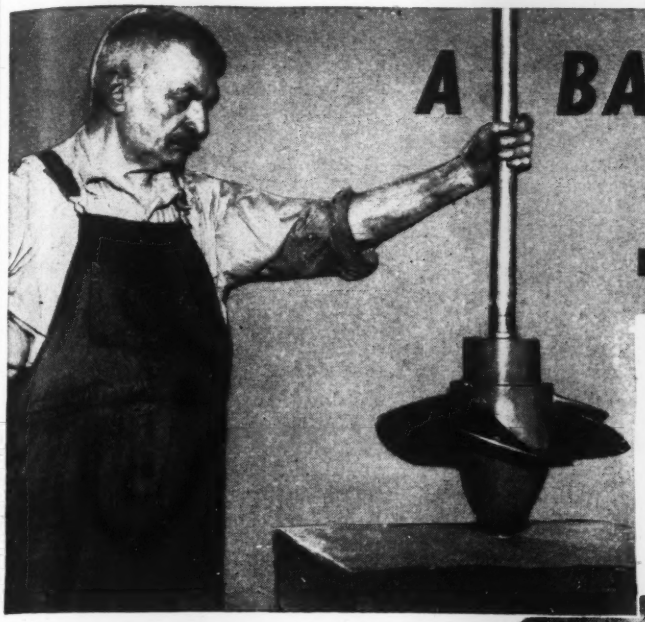
Wash., Mount Vernon — School Dist., Mount Vernon gymnasium, bus garage and farm shop addn., **$190,000;** school, **$70,000;** Conway Grade School addn., **$78,000.** Financing not provided.

Wash., Nooksack—Nooksack Valley School Dist., Nooksack, rein.-con. school. $250,000. Financing not provided.

Wash., Orting—State Soldiers Home, Orting, dining hall, kitchen and cold storage plant, **$111,000;** auditorium **$97,500;** completing Roosevelt Barracks, **$97,500.** Financing not provided.

★**Wash., Seattle**—King Co., Dr. A. J. Hockett, medical dir., County-City Bldg., 3 and James Sts., Zone 4, hospital in South End Industrial Dist., $5,000,000; Harborview County Hospital addns., $2,000,000. Financing not provided.

Wash., Sedro-Woolley — School Dist., Sedro-Woolley, primary bldg., $120,000; vocational bldg. addn., **$30,000;** remodeling high school gymnasium, **$50,000;** Samish School, **$40,000.** Financing not provided.



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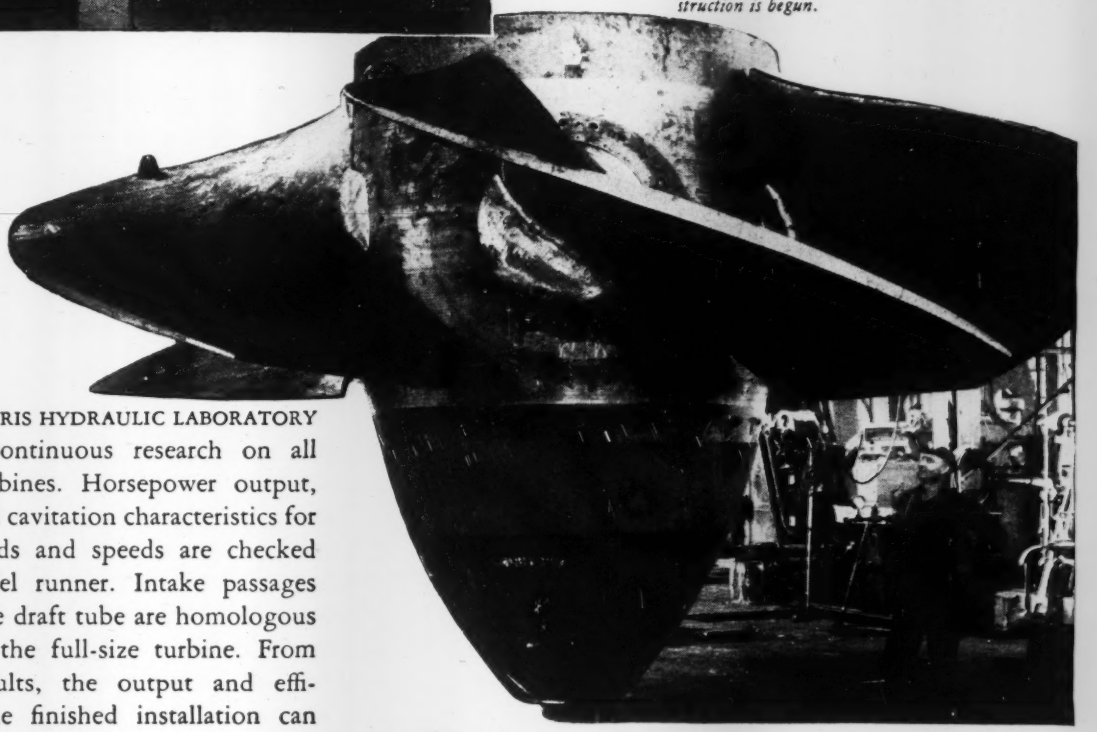

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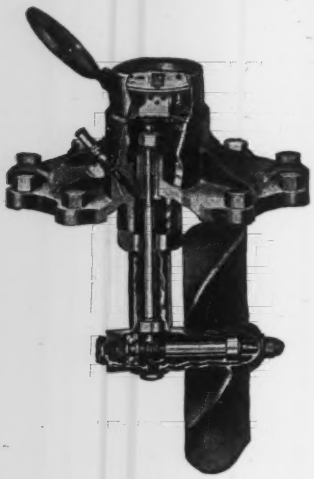

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POSTWAR PROJECTS (Cont'd.)

Wis., Elkhorn—Walworth Co., L. D. Dyslap, clk., courthouse, **$350,000.** Financing not provided.

★**Wis., Milwaukee**—City, Milwaukee Auditorium Bd., Milwaukee, auditorium addn., **$2,600,000.** Land rights not cleared, financing not provided.

Wis., Wausau—City, J. L. Brown, clk., auditorium. **$450,000.** Financing not provided.

PLANS UNDER WAY

Calif., Petaluma—City, City Hall, plans by J. Clarence Felciano, 4010 Montecito Ave., Santa Rosa, 2 story city hall, $200,000; 1 story auditorium and recreational bldg., **$220,000.** Bonds voted.

Calif., Santa Ana—Bd. Educ., Santa Ana, plans by R. C. Flewelling, 816 W. 5 St., Los Angeles, Junior College, 7 and Bristol Sts. Over **$150,000.** To vote bonds.

Calif., Stockton—San Joaquin Co., c/o Clerk, Stockton, plans by H. A. Thomsen, Jr., 315 Montgomery St., San Francisco, E. G. Ernst, 561 E. Harding Way, F. W. Mayo, 3119 N. American St. and J. U. Cloudesley, 309 Exchange Bldg., rein.-con. courthouse and jail. Over **$150,000.** Financing not provided. CD 2/8—ENR 2/22.

Calif., Stockton—Stockton Unified School Dist., San Joaquin and Lindsay Sts., plans by E. G. Ernst, 561 E. Harding Way, 1 story, rein.-con. Elmwood School, $280,000. Financing not provided. CD 2/8—ENR 2/22.

Conn., Danbury—City, Bd. Educ., Danbury, plans by Philip N. Sunderland, Inc., 51 West St., 2 story, brick, steel trade school, White and Osborn Sts. **$250,000.** Financing not provided.

Conn., Darien—Town, T. Holden, chr., Development Comn., Darien, plans by L. Murray Franklin, 101 Park Ave., New York, N. Y., brick, stone town hall. Over **$150,000.** Financing not provided. CD 8/13/43—ENR 8/19/43.

★**Ga., Atlanta**—City of Atlanta, Bldg. Dpt., City Hall, plans by Robert & Co., Bona Allen Bldg., auditorium addn. **$1,000,000.** CD 1/12/44—ENR 1/27/44.

Ga., Atlanta—City, City Hall, plans completed by Robert & Co., Bona Allen Bldg., municipal auditorium annex for exhibits, **$450,000.** Financing not provided.

★**Ga., Atlanta**—City Bd. Educ., Miss Ira Jarrell, supt., City Hall, plans completed by Barili & Humphreys, Forsythe Bldg., Edward S. Cook School, **$160,000;** plans completed by E. Wachendorff, 811 Peachtree St., J. C. Murphy Jr. High School, $600,000; plans completed by Arthur Neal Robinson, Sr. & Jr., Hendry Grady Bldg., Booker T. Washington High School addn., $250,000; plans completed by J. Wilhoit, Mortgage Guaranty Bldg., Williams St. School, $210,000. Financing not provided. CD 9/15/44—ENR 10/5/44.

★**Ind., Elkhart**—Bd. School Trustees, H. H. Hurt, Supt. Schools, Elkhart, plans by Maurer & Maurer, 312 Lafayette Bldg., South Bend, brick high school, $550,000. CD 10/19—ENR 11/2.

Ind., Rushville—Comrs. Rush Co., M. Ball, aud., Court House, plans by W. Scholer, 1114 State St., Lafayette, 2 story, bsmnt., brick, stone memorial hospital, **$200,000.**

Kan., Arkansas City—City, C. King, mgr., City Hall, plans by Wm. T. Schmitt, & W. G. Parr, 1634 N.W. 10 St., Oklahoma City, Okla., municipal war memorial hospital and nurses' home. **$350,000.**

La., Pineville—State Dpt. Inst., R. L. Pettit, dir., Baton Rouge, plans by H. E. Schwarz, Giddens-Lane Bldg., Shreveport, two 1 story, brick, concrete ward bldgs., State Colony & Training School, **$200,000.**

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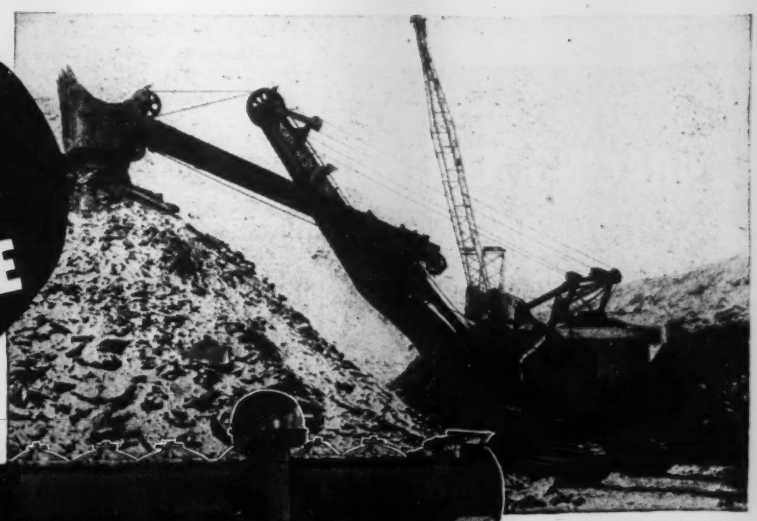

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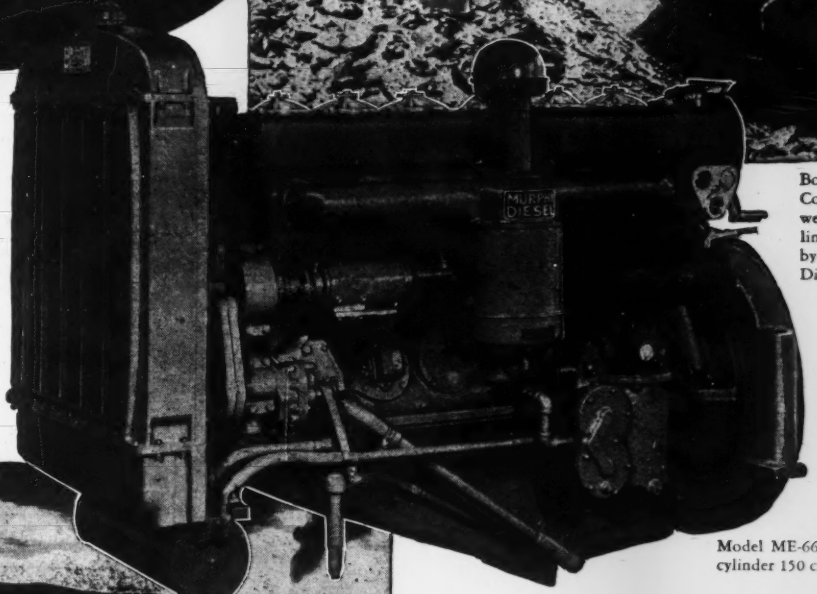
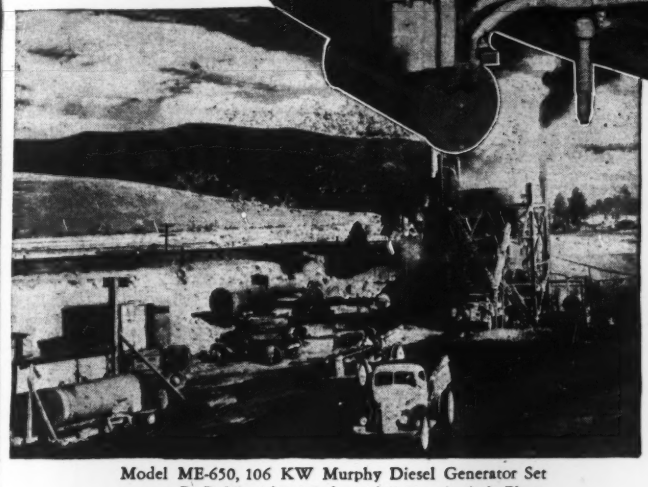


Model ME-66, 6" x 6¼", 6-cylinder 150 continuous H.P



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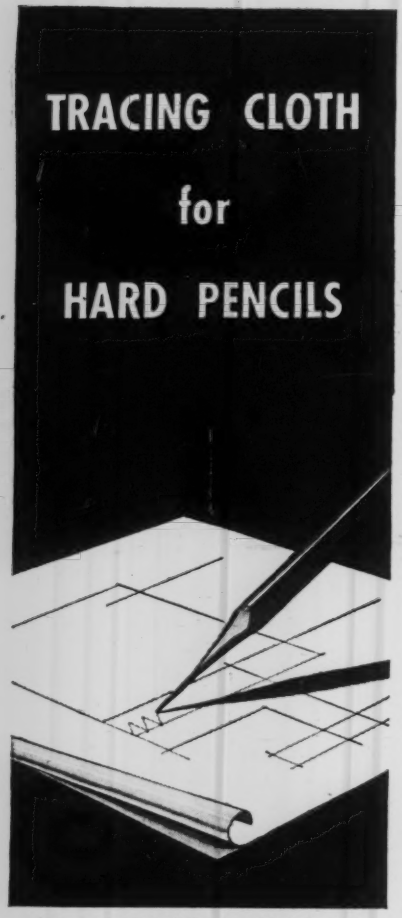

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POSTWAR PROJECTS (Cont'd.)

Maryland—Bd. Educ. Howard Co., Court House, Ellicott City, plans by W. W. Emmart, 1323 Fidelity Bldg., Baltimore, Zone 1, consolidated negro school at Ellicott City, school at Elkridge, and school addn. at West Friendship, **$250,000.**

+Mass., Boston—Federal Reserve Bank, 30 Pearl St., plans by Cret & Livingston, 1518 Walnut St., Phila., Pa., 5 story, 86 x 132 ft., granite, limestone bank addn., alterations, Pearl and Milk Sts. Over **$150,000.** Financing not provided.

Mass., Bridgewater — Town School Bd., Bridgewater, plans by J. Williams Beal Sons, 185 Devonshire St., Boston, 2 story, bsmnt., brick, steel Junior High School, Legion Field. **$250,000.** Financing not provided. CD 3/31—ENR 4/20.

★**Mass., Norfolk**—Commonwealth of Massachusetts, Dpt. Mental Health, 100 Nashua St., Boston, plans completed by Ganteaume & McMullen, 99 Chauncy St., Boston, brick, steel, concrete central bakery, PG 1, **$500,000.** Financing not provided. CD 6/12/44—ENR 6/29/44.

Mass., Reading—Town, Supt. Schools, Town Hall, plans by G. H. Sidebottom, 112 Summer Ave., school, to exceed **$150,000;** plans by Adden, Parker, Clinch & Crimp, 177 State St., Boston, high school, to exceed **$150,000.**

★**N. H., Portsmouth**—City, Supt. Schools, City Hall, plans completed by Alfred T. Granger Assoc., Main St., Hanover, 3 story, bsmnt., concrete, brick high school. **$1,000,000.** Financing not provided. CD 12/21—ENR 1/11.

N. J., Newark—Port of New York Authority, 111 8th Ave., New York 11, N. Y., plans under way 200 x 1,000 ft. terminal structure with 100 x 1,000 ft. freight platform, Union Inland Freight Station 3, **$2,600,000.** Financing provided, land rights not cleared. J. C. Evans, ch. engr. R. Smiley, engr. of design.

O., Bowling Green—Bowling Green State University, F. J. Prout, pres., Bowling Green, plans by J. K. Raney, 320 Sand Ridge Rd., 1 story, brick, concrete science bldg. **$200,000.** Legal obstacles to be overcome. T. E. Brand, State Office Bldg., Columbus, state archt. and engr.

★**O., Cincinnati**—Bd. Comrs. Hamilton Co., Court House, plans by Potter, Tyler & Martin, 35 E. 7 St., and Felsberg & Gillespie, Ingalls Bldg., court house annex. **$1,000,000.** Financing available. Land rights not cleared. W. Pistler, 4 W. 7 St., mech. engr. CD 11/21—ENR 12/14.

★**O., Cincinnati**—University of Cincinnati, R. H. Walters, pres., Burnet Woods, plans by Potter, Tyler & Martin, 35 W. 7 St., and Hunt & Allen, Eagle Savings Bldg., university armory and field house on probable site at Burnet Woods, **$650,000;** women's dormitory, **$350,000.** Land rights not cleared.

★**O., Columbus**—Ohio Welfare Dpt., State Office Bldg., S. Front St., Columbus, plans by T. E. Brand, state archt., State Office Bldg., S. Front St., penitentiary replacing antiquated penitentiary, **$5,000,000.**

★**O., Columbus**—State Office Bldg., S. Front St., Columbus, plans by T. E. Brand, state archt., S. Front St., 2 wing addn. to State Office Bldg. in downtown Columbus, **$5,000,000.**

O., Toledo—Comrs., Lucas Co., Court House, tentative architectural drawings by Bellman, Gillett & Richards, 518 Jefferson St., county home, incl. 1 story, multi-wing bldg. at rear of present bldg. Arlington Ave. **$455,000.** Latter to be razed when new structure is completed. Financing not provided.

O., Wooster—State Agricultural Dpt., State Office Bldg., S. Front St., Columbus, plans by T. E. Brand, state archt., State Office Bldg., S. Front St., bldgs. at State Agriculture Experiment Station, **$242,000.**

★**O., Worthington**—State Welfare Dpt., State Office Bldg., S. Front St., Columbus, plans by T. E. Brand, state archt., State Office Bldg., S. Front St., 2 schools for deaf and blind, on site already purchased north of here, comprising Wyandot County club grounds, **$5,472,510.**

Tex., Abilene—Bd. Educ., c/o L. E. Dudley, Abilene, plans 25% completed by David S. Castle Co., 1082½ N. 1 St., brick, concrete school units, **$165,000.** Financing not provided.

Tex., Austin—City, City Hall, plans 75% completed by Associated Architects of Austin, c/o L. Page, Nalle Bldg., 4 story, bsmnt. police and courts bldg., steel, cut stone. **$200,000.** Financing provided. Matthews & Kenan, 1615 Transit Tower Bldg., San Antonio, consult. engrs. CD 3/16—ENR 4/5.

Tex., College Station—City, c/o S. B. Cook, College Station, preliminary plans light plant and electric distr. sys. Approx. **$148,000.** Financing not provided.

★**Tex., Denton**—City, City Hall, defeated **$700,000** bonds, expanding, imprv. municipal electric light and power plant sys. (exclusive of outside lighting). Plans new bond election soon. J. E. Ward, Harvey-Snider Bldg., Wichita Falls, consult. engr. CD 6/4—ENR 6/14.

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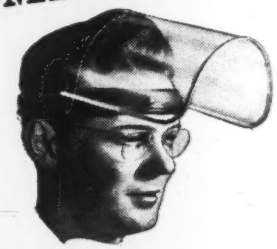

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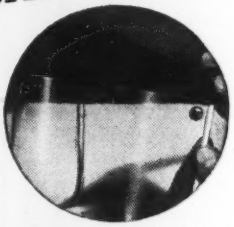

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POSTWAR PROJECTS (Cont'd.)

★ **Tex., Texas City**—Texas City Ind. School Dist., Texas City, plans 10% completed by Jones & Tabor, Union National Bank Bldg., Houston, and Voelcker & Dixon, 2501 San Jacinto St., Houston, school No. 1, **$150,000;** school, No. 2, **$150,000;** high school between 14 and 16 Aves., **$300,000.** Financing not provided. CD 4/25—ENR—5/3.

★ **Va., Burkeville**—Dr. J. Belmont Woodson, supt., Piedmont Sanatorium, Burkeville, plans under way dormitories, administration bldg., etc., at Piedmont Sanatorium, **$1,070,000.** F. Q. Saunders, Richmond, state engr. CD 10/11.—ENR 10/19.

Wash., Bellevue—Overlake School Dist., D. E. March, supt., Bellevue, plans by G. W. Stoddard, Orpheum Bldg., Seattle, Zone 1, 2 story, brick high school addn. **$160,000.** Financing not provided.

Wash., Walla Walla—City, City Hall, plans by Morgan & Crawford, 1st National Bank Bldg., street and sanitary storage bldg., etc., **$160,000.** Financing not provided. CD 5/16—ENR 5/31.

Alaska, Juneau—City, City Hall, plans under way municipal bldg., **$300,000;** school, **$25,000.** Financing not provided. J. L. McNamara, City Hall, city engr.

READY FOR BIDS

★ **Conn., Willimantic**—State, Dr. A. H. Grace, State Bd. Educ., Hartford, plans completed by C. J. Maimfeldt, 36 Pearl St., Hartford, and B. H. Palmer, Jr., 189 Harland Rd., Norwich, Willimantic State Teachers College, Valley St. **$820,000.** Financing provided. CD 6/16/44—ENR 7/13/44.

Fla., Sanford—State, Tallahassee, plans completed by University of Florida, Eng. Dpt., Gainesville, bldg. for branch agricultural experiment station, **$285,000.** Financing provided.

Fla., Tallahassee—State, Tallahassee, plans completed by University of Florida, Eng. Dpt., Gainesville, Supreme Court bldg., instead of addn. to old bldg. as formerly planned. **$375,000.** Financing provided. CD 6/29—ENR 7/13.

Wis., Viroqua—Vernon Co., M. Roldt, comr., plans completed by Law, Law, Potter & Nystrom, Madison, 1 and 2 story, 82x207 ft. garage, **$145,000.** Financing provided. CD 11/30—ENR 12/14.

ADVANCED TO ACTIVE STATUS

★ **Calif., Los Angeles**—City Dpt. Water & Power, 207 S. Bway., project cancelled, steam-electric generating plant, Fries Ave. and B. St., in Wilmington. **$6,500,000.** Work now going ahead. S. B. Morris, 207 S. Bway., engr. CD 1/31—ENR 2/22.

COMMERCIAL BUILDINGS

PROPOSED WORK

Colo., Denver—Denver Athletic Club, Gleneagle arm, sketches under way bldg. addn. **$200,000.**

Conn., Bridgeport—North End Talmud Torah, I. J. Sheiman, chn. Bldg. Com., 1[illegible] Thompson St., brick, stone, synagogue, **$150,000.** Financing not provided.

Conn., Danbury—First Church of Christ (Scientist), Deer Hill Ave., brick, stone church, Deer Hill Ave. **$150,000.** Financing not provided.

Ga., Atlanta—West End Baptist Church, J. L. Waldron, pastor, church bldg. and Sunday School, **$300,000.** Site purchased.

Ga., Columbus—American Legion, c/o W. Joy, chn. Bldg. Com., Columbus, memorial bldg. **$300,000.** Site not selected.

Mass., Boston—Salvation Army, [illegible] Brookline St., hospital. To exceed **$150,000.** Funds being raised.

N. Y., New York—Lador, Inc., 307 5 Ave., 6 story apartment Marion Ave and E. [illegible] St. **$150,000.** Financing provided.

★ **N. Y., New York**—Post Graduate Medical School & Hospital, 304 E. 20 St., clinic, classrooms and laboratory bldg., adjacent to present structure; private pavilion of 200 beds, medical school, hospital unit for ward beds. **$6,500,000.** Financing not provided.

★ **O., Cincinnati**—Xavier University, C. J. Steiner, S. J., pres., Victory Pkwy., physics bldg., new auditorium and north wing addn. to men's residence hall. **$1,000,000.** Legal obstacles to be overcome, financing not provided.

Pa., Harrisburg—Osteopathic Hospital, 12[illegible] Chestnut St., 50 bed osteopathic hospital, **$300,000.** Financing not provided.

Pa., Huntingdon—Juniata College, C. M. Ellis, pres., Huntingdon, student recreation center and war memorial gymnasium for men. **$200,000.** Financing not provided.

★ **Pa., Oakmont**—Western Pennsylvania Presbyteries, Commonwealth Bldg., Pittsburgh, old folks home. **$800,000.** Financing not provided.

Tex., Houston—St. Thomas School, [illegible] Memorial Dr., principal bldg. for 4-year co-educational college. **$350,000.** Financing provided.

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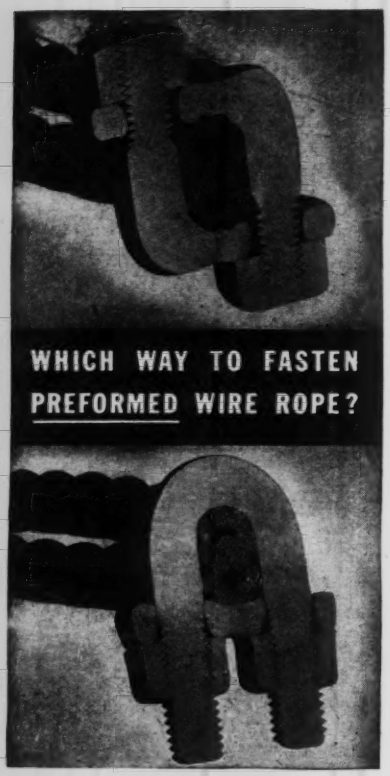

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POSTWAR PROJECTS (Cont'd.)

Tex., Houston—South End Christian Church, J. E. Meroney, chn. Bldg. Comn., 4000 S. Main St., church **$150,000.** Financing provided. CD 4/20—ENR 5/3.

Tex., San Antonio—Rob. B. Green Memorial Hospital, 515 Morales St., modernization and new unit to hospital, incl. laundry plant, boiler house, etc. **$150,000.** Financing not provided.

Wash., Wenatchee—Deaconess Hospital, P. Scea, pres., Hospital Bd., Wenatchee, hospital addn. **$250,000.** Financing provided.

★**W. Va., Charleston**—Morris Harvey College, Library Bldg., college hall and library. **$750,000.**

PLANS UNDER WAY

Ala., Birmingham—Liberty National Life Insurance Co., 20 St. and 3 Ave. S, plans by Warren, Knight & Davis, Protective Life Bldg., 3 story office bldg. addn. **$200,000.** CD 6/4.

★**Calif., San Mateo**—San Mateo Investment Co., A. Johnson, 632 Belvedere St., San Francisco, plans under way 659 residences **$5,272,000;** 10 apartment houses **$200,000** and 72 store bldgs., **$720,000,** all in large subdivision. Financing not provided.

Calif., West Los Angeles—Westwood Hills Christian Church, c/o Rice & Crosby, archts., H. W. Hellman Bldg., Los Angeles, preliminary plans under way rein.-con. church, U.C.L.A. campus, Westwood. **$300,000.**

Colo., Denver—Shaner Bros., c/o E. C. Morris, archt., Empire Bldg., sketches commercial bldg. **$250,000.**

★**Conn., New Haven**—Grace-New Haven Hospital, D. Spencer Berger, 135 Derby Ave., plans by D. Orr, 96 Grove St., 14 story, 300x450 ft., brick, steel hospital, Oak, South and York Sts. **$4,000,000.** Site acquired. Financing not provided. CD 2/8—ENR 3/8.

Fla., Jacksonville—Southside Baptist Church, Atlantic Blvd., plans 80% completed by H. E. Saxelby, Hilderbrant Bldg., auditorium and educational bldg. addn., on church property, Atlantic Blvd. **$250,000.** Financing provided.

Ga., Waleska—Rinehardt College, J. R. Burgess, Jr., pres., Waleska, plans by Wm. J. J. Chase, 140 Peachtree St. N.W., Atlanta, administration bldg. **$250,000.**

★**Ind., Fort Wayne**—Parkview-Memorial Hospital, Dr. E. T. Franklin, supt., 119 W. Lewis St., plans by A. M. Strauss, 415 Cal-Wayne Bldg., brick, rein.-con. hospital. **$500,000.**

Mass., Cambridge—Christ Church, 19 Farwell Pl., plans nearing completion by C. Collens, 71 Newbury St., Boston, parish house, incl. service rooms, social hall, offices, library, etc. **$150,000.** Financing not provided.

★**Mass., Worcester**—Bd. Trustees Holy Cross College, College St., plans by Maginnis & Walsh, 126 Newbury St., Boston, science and faculty bldg., on campus. **$700,000.** Financing not provided.

★**Minn., Minneapolis**—L. S. Donaldson Co., T. T. Brouillette, pres., Nicollet Ave. between 6 and 7 Sts., plans by Larson & McLaren, 1901 Foshay Tower, department store modernization, incl. remodeling construct addns. on top of present structure, **$2,500,000.** CD 5/31.

Minn., Minneapolis — First Unitarian Society, 1526 Harmon Pl., plans by Long & Thorshov, 1200 2 Ave. S., church, site near Hennepin and Mount Curve Aves. **$150,000.**

Minn., Minneapolis—Stouffer Corp., V. Stouffer, pres., 1375 Euclid St., Cleveland, O., plans by P. Ockart, 1836 Euclid Ave., Cleveland, O., and Larson & McLaren, 1901 Foshay Tower, Minneapolis, assoc. archts., 3 story, bsmnt., 45x155 ft., structural steel, brick restaurant, 89 S. 7 St. **$250,000.**

Mo., Kansas City—City Bd. for the Catholic Order, c/o F. C. Downey, atty, for the Benedictine Sisters, Gloyd Bldg., plans by J. B. Shaughnessy, Reliance Bldg., 3 story, native stone shrine for the Benedictine Sisters, Meyer Blvd. from unimproved Lydia Ave to the Paseo. **$250,000.**

★**N. H., Meriden**—Kimball Union Academy, Meriden, plans by J. Frederick Larson, 104 E. 56 St., New York, N. Y., 2 story gymnasium, incl. lobby, lockers, showers and swimming pool, campus. **$250,000;** 2 brick, steel dormitory units, **$200,000;** infirmary and dining hall for 300, **$150,000.** Financing not provided.

N. Y., Bronxville—Concordia Collegiate Lutheran Institute, Bronxville, plans by Shreve, Lamb & Harmon, 11 W. 44 St., New York, Zone 18, educational bldg. housing library, sciences and auditorium facilities. **$280,000.** Financing provided. CD 10/5—ENR 10/19.

★**N. Y., Buffalo**—Buffalo General Hospital, 100 High St., plans by Crow, Lewis & Wick, 200 5 Ave., New York, Zone 10, 12 story, cross-shaped bldg., providing administrative and service quarters, maternity dpt., and psychiatric and tuberculosis facilities and remodelling old bldgs. **$4,000,000.** Financing not provided. CD 4/20—ENR 5/3.

★**N. Y., New York**—Cathedral of St. John The Devine, Amsterdam Ave. and 112 St., plans under way completing great arch in the crossing, completing north transept, building south transept, completing two western towers, raising outer roof of choir and

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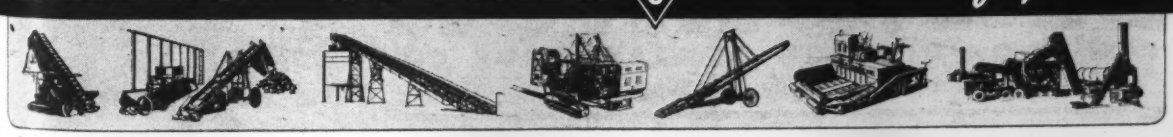

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POSTWAR PROJECTS (Cont'd.)

sanctuary, building central tower, $1[illegible],000. Financing not provided. Fund raising campaign under way.

O., Norwood—Young Mens Christian Assn., Sherman and Walters Aves., plans by C. F. Celarius, 111 E. 4 St., Cincinnati, YMCA bldg., swimming pool on 100x127 [illegible] ft., site, **$250,000.**

★ **Okla., Oklahoma City**—C. E. Duffner Co., 1201 N.W. First St., plans 10% completed by Noftsger & Lawrence, 2327 N.W. 23 St., one hundred 2 story, residences, Nichols Hills addns., incl. streets, utilities. **$2,000,000.**

Pa., Phila.—Warner Bros., 11 and Market Sts., plans 75% completed theatre, Torresdale Ave. and Friendship St. **$150,000.** Financing provided.

Tex., Brownwood—Howard Payne College, Brownwood, plans 50% completed 3 unit brick, rein.-con. apartment for married students, **$150,000.** Financing not provided. CD 6/1/44—ENR 6/15/44.

Tex., Dallas—Sacred Heart Parish, 1[illegible] N. Pearl St., plans 25% completed by M. C. Kleuser, Texas Bank Bldg., rein.-conc. stone auditorium, **$150,000.** Financing provided.

Tex., Houston—Garden Oaks Methodist Church, 822 Rosslyn Rd., plans 10% completed by H. G. Moore, 2008 W. Alabama St., 1 and 2 story, brick, rein.-con. church, air-conditioning, etc. **$150,000.** Financing not provided.

Tex., Irving—First Baptist Congregation, Irving, plans 5% completed by B. D. Easterwood, 806½ Taylor St., Fort Worth. 150x1[illegible] ft., brick, concrete church. **$110,000-$150,000.**

Tex., Oak Cliff—Oak Cliff Presbyterian church, 300 W. 10 St., plans 40% completed 2 or 3 story, brick, rein.-con. educational and recreational bldg. **$250,000.**

★ **Tex., San Antonio**—H. B. Zachry Co., Transit Tower Bldg., plans by Rob. W. Ayres, Transit Tower Bldg., dwelling, **$1,000,000.** Financing provided.

★ **Utah, Salt Lake City**—Latter Day Saints Hospital, 8 Ave. and C St., plans by Young & Hansen, Pacific National Life Bldg., imprv. hospital, incl. nurses home and school, heating plant, 200-bed maternity div., offices, landscaping and parking facilities, **$1,300,000.** Dr. B. W. Black, Oakland, hospital consult.

Vt., Burlington—Abraham's, 111 Church St., sketches completed by L. S. Newton, 1[illegible] S. Paul St., office bldg. and warehouse, Bank St. To exceed **$100,000.**

★ **Va., Richmond**—Miller & Rhoads, 517 E. Broad St., plans by Carneal, Johnston & Wright, Atlantic Life Bldg., 6 and Main Sts., 12 story department store, Fifth and Broad Sts. **$3,000,000.** CD 11/1—ENR 11/16.

Wash., Spokane—Whitworth College, Dr. F. Warren, pres., Country Homes Estate, plans by Rigg & Vantyne, Peyton Bldg., 4 story, rein.-con., brick educational bldg., **$250,000;** central heating plant, $50,000; altering other campus bldgs., $50,000. Financing provided. CD 5/3—ENR 5/17.

Wash., Tacoma—College of Puget Sound, R. Franklin Thompson, pres., Tacoma, plans by Dugan, Mock & Morrison, Rust Bldg., dormitory, **$115,000;** library, **$100,000;** president's residence, **$30,000;** landscaping campus, **$30,000.** Financing provided.

W. Va., Morgantown—Trinity Episcopal Church, Morgantown, plans by P. H. Feldman, Washington Cathedral Office Bldg., Wash., D. C., church, parish hall, rectory, Spruce and Willey Sts. **$200,000.** Financing not provided.

READY FOR BIDS

Fla., Jacksonville — Duval Co., Medical Society, c/o Dr. J. M. Bryant, 1022 Park St., plans completed Duval Medical Society and professional office bldg. for members of medical profession, approx. **$150,000.** Financing provided.

Mass., Holyoke—Young Men's Christian Assn., 367 High St., plans completed by Tessier & Maloney, 220 Dwight St., Springfield, 5 story, concrete, steel YMCA bldg., incl. gymnasium and swimming pool, Park St. **$400,000.** Financing provided. CD 8/[illegible]—ENR 9/7.

Mass., Worcester—Bd. Trustees Holy Cross College, College St., plans completed by Maginnis & Walsh, 126 Newbury St., Boston, gymnasium, incl. swimming pool, **$375,0[illegible].** Financing provided. CD 4/30—ENR 5/17.

O., Willoughby—Scoville, Essick & Rae, Film Exchange Bldg., Cleveland, plans completed by P. Metzinger, Empire Bldg., Cleveland, motion picture theater and shopping center. **$150,000.** Financing provided.

★ **Tex., Houston**—Glenn H. McCarthy, Inc., Sterling Bldg., plans completed by Hedrick & Lindsley, archts. and consult. engrs., 811 S. Standard Bldg., two 10 story, brick, rein.-con., apartment-hotels, **$1,250,000** each; three 12 story, brick, rein-con., apartment-hotels, **$1,750,000** each; 18 story, basement, 152-apartment, brick, rein.-con., apartment-hotel, **$4,000,000;** theatre, **$250,000;** gymnasium, brick, rein.-con., stone, granite store bldg., **$1,500,000;** department store, $250,0[illegible]. Financing provided.

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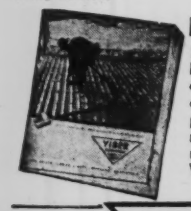

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POSTWAR PROJECTS (Cont'd.

Wis., Fort Atkinson—Fort Atkinson Memorial Hospital, Fort Atkinson, plans completed by E. A. Stubenrauch, 708 Erie Ave., Sheboygan, hospital. **$250,000.** Financing provided. CD 1/17—ENR 2/8, under Public Buildings.

BIDS ASKED

Bids Asked About July 1

N. J., Hackensack—A. O. Lynas, archt., 370 Lexington Ave., New York 17, N. Y., 2 story bsmnt. store, Main and Passaic Sts., for occupancy Arnold Constable & Co., for Noca Corp., 210 Main St. Over **$150,000.**

CONTRACTS AWARDED

Md., Baltimore—Williamsburg Shopping Center, 1350 O'Sullivan Bldg., shopping center, incl. forty 1 story, bsmnt. stores, theatre, service station and parking area, for about 625 acres. Owner builds. **$350,000.** K. C. Miller, 3555 Newland Rd., archt.

★**Mo., Kansas City**—Owner, c/o contractor, 6-8 story apartment hotel, Brookside Blvd. between 56 and 57 Sts., to J. E. Dunn Constr. Co., Reliance Bldg. Est. **$1,000,000.**

N. Y., Garden City—L. P. Anziano, 544 Franklin Ave., store, 9 St. and Franklin Ave. for occupancy by Franklin Simon & Co. Owner builds. **$150,000.** Herbert B. Beidler, 952 N. Michigan St., Chicago, Ill., archt.

N. Y., New York—Guaranty Trust Co., 140 Bway., Zone 7, alterations providing banking facilities on concourse street level, mezzanine and second floor at 40 Rockefeller Plaza, 50 St. to Turner Constr. Co., 420 Lexington Ave., Zone 17, Est. **$150,000.** Halsey McCormack & Helmer, Inc., 285 5 Ave., Zone 16, archts.

N. Y., New York—Simon Bros., 292 Madison Ave., Zone 17, 100x200 ft. apartment, 5 Ave. and 68 St. Owner builds. Over **$150,000.** R. M. Boak, 175 Fifth Ave., Zone 10, archt.

ADVANCED TO ACTIVE STATUS

Tex., Houston—St. Elizabeth Hospital, 1910 Crawford St., project cancelled, hospital. **$175,000.** Work now going ahead. CD 8/25/44—ENR 9/7/44.

Tex., Odessa—Jno. W. Perry and R. O. Canon, Odessa, project cancelled 8 story, bsmnt., brick, rein-con., steel office bldg. **$450,000.** Work now going ahead. CD 12/11—ENR 12/28.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., San Jose—CANNERY—Abinante & Nola Packing Co., 200 Ryland Ave., 2 story fruit cannery, **$50,000.**

Me., Bangor—WAREHOUSE—R. B. Dunning & Co., 54 Broad St., warehouse. To exceed **$40,000.**

Mass., Gardner—PLANT—L. Hardy, 17 Mill St., Worcester, making sketches 1 story, 60x180 ft., concrete, brick, steel mfg. bldg. To exceed **$40,000** with equip.

★**Minn., Crookston**—POWER PLANT—Otter Tail Power Co., Fergus Falls, C. G. Wright, vice pres., power plant expan.; installing enlarged turbine power plant, etc. **$750,000.**

Minn., Frazee — PLANT — Turkey Growers Assn., D. Mickelson, pres., Frazee, 1 story, 60x100 ft. processing plant, **$40,000.**

★**N. Y., Rochester** — BUS TERMINAL — Greyhound Bus Lines, 72 Franklin Sq., 2 story, glazed brick terminal, Franklin Sq. **$1,000,000** incl. site.

Ore., Medford—BUS TERMINAL—Greyhound Bus Lines, 5 and Mission Sts., San Francisco, Calif., bus terminal, **$75,000.** Financing provided.

Ore., Oregon City—BUS TERMINAL—Greyhound Bus Lines, 5 and Mission Sts., San Francisco, Calif., imprv. bus terminal, **$45,000.** Financing provided.

Ore., Portland—BUS TERMINAL—Greyhound Bus Lines, 5 and Mission Sts., San Francisco, Calif., bus terminal addnl. maintenance facilities. **$75,000.** Financing provided.

Ore., Salem — BUS TERMINAL — Greyhound Bus Lines, 5 and Mission Sts., San Francisco, Calif., bus terminal, **$70,000.** Financing provided.

★**South Carolina**—PLANT—Robert Gair, Inc., 155 E. 44 St., New York 17, N. Y., paper box plant with docks and mill village on Santee-Cooper basin. **$12,000,000.**

Tex., Dallas—GARAGE, etc.—Yellow Transit Co., 311 S.W. Weston Ave., Oklahoma City, Okla., 1 and 2 story, garage and 200 ft. loading dock. Over **$60,000.** Site purchased. Financing provided.

Tex., El Paso — WAREHOUSE — Monsen-Dunnegan-Ryan Co., El Paso, 120 x 260 ft., brick, rein.-con., stone warehouse, **$200,000.** Financing provided.

Tex., Fort Worth—GRAIN ELEVATOR—Producers Grain Corp., Fair Bldg., grain elevator storage imprvs. **$40,000.** Financing provided.

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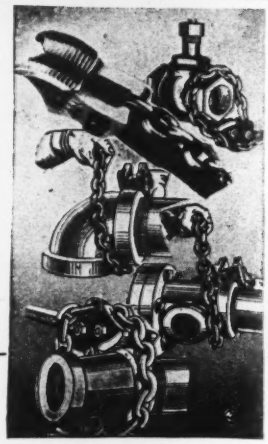

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POSTWAR PROJECTS (Cont'd.)

Tex., Houston — WAREHOUSE [illegible] Texas Co. Ltd., 6931 Harrisburg [illegible] warehouse. $80,000 or more. [illegible] available. Site purchased.

Ont., Windsor—PLANT—Fitwell [illegible] Mfg. Co., Ltd., Windsor, plant addn. $50,000. Site purchased.

PLANS UNDER WAY

Calif., Pasadena—WAREHOUSE [illegible] Owner, c/o Norstrom & Anderson, [illegible] Insurance Exchange Bldg., Los [illegible] story, bsmnt., 135x163 ft., brick, [illegible] crete warehouse, offices and cafe [illegible] Arroyo Parkway and Bellevue Dr. $385,000. Financing provided.

Conn., Portland—FACTORY—[illegible] Mfg. Co., I. M. Wolfson, 62 [illegible] Ave., West Hartford, plans by C. [illegible] 16 Elm St., East Hartford. 1 story, [illegible] 80x140 ft., brick, steel factory. [illegible] Ave., $43,000. CD 4/20—ENR 4/26, under Industrial.

★**Md., Baltimore** — PLANT — [illegible] States Co-Operative, Inc., 10 [illegible] Sts., Richmond, Va., plans by A. [illegible] & Co., 344 Delware Ave., Buffalo, N. Y. [illegible] and poultry feed plant, Union Stock Yards, Desoto and Georgetown Rds., $1,500,000.

★**Minn., St. Paul**—FACTORY—[illegible] Mining & Mfg. Co., W. L. McKnight, pres., 900 Fauquier and Mendota Sts., plans by Toltz, King & Day, 1509 Pioneer Bldg., 4 story, 200x508 ft. factory adjoining present plant, and 1 story, 50x75 ft., brick bldg., $2,000,000. CD 3/28—ENR 4/5.

N. H., Concord—PLANT—The [illegible] Press, 10 Ferry St., plans nearing completion by Austin Co., 19 Rector St., New York, N. Y., 4 story, bsmnt., 100x100 ft., concrete, steel bldg., 1 story, bsmnt., 140x150 ft., brick bldg., 1 story, bsmnt., 100x150 ft. bldg., Ferry St., $400,000.

Tex., Dallas—SHOP, etc.—L. E. O'Bannon, 2610 Fairmount St., plans 50% completed solid masonry, stone and concrete steel sash motor shop, $50,000; plans 75% completed warehouse, $60,000. Financing provided.

Tex., Denison—PLANT—Kraft Cheese Co., 500 N. Peshtigo St., Chicago, Ill., plans under way cheese plant. $50,000. Financing provided.

Tex., El Paso—FOUNDRY—Texas Aluminum Casting Co., El Paso, plans 20% completed, foundry. $100,000. Financing available.

Tex., Houston—PLANT—C. G. Dyson & E. E. Dyson, 2124 Bartlett St., plans 40% completed 1 story meat processing plant, rein. con.; 1 story boiler house, etc. $48,000. Financing provided. Lockwood & Andrews, Union National Bank Bldg., consult. engr.

Tex., Houston—SERVICE SHOP—J. Fred Hutchins, 3120 White Oak St., plans completed H. Lloyd, 4605 Montrose Blvd., service shop bldg. $40,000. Financing provided.

Tex., Houston—PLANT—A. [illegible] Marx Welding Co., 1107 Austin St., plans completed steel, brick plant bldg. $40,000. Financing provided.

Tex., Houston—SHOP—J. Simmons & W. Gruver, Abilene, plans 10% completed 1 story, concrete, masonry, air-conditioned fireproof automotive shop. $60,000. Financing available. Site purchased.

Tex., Houston—PLANT—J. H. Sullenger Co., 1816 Bolsover St., plans 25% completed 1 story, bsmnt. meat processing plant, rein. con., masonry. $140,000. Financing provided.

Tex., Houston — SERVICE — The White house, 316 Louisiana St., plans 50% completed service bldg. $50,000. Financing provided.

Tex., Sherman—SHOP—Lowe's Mart Supply Co., Sherman, plans 50% completed by Avery, Shanklen & Associates, 1420½ Wood St., Dallas, supply shop, $40,000. Financing provided.

READY FOR BIDS

Conn., New Haven—WAREHOUSE, etc.—Warner Brothers, Inc., 321 W. 44 St., New York, N. Y., plans completed by E. C. Bullock, 119 W. 57 St., New York, N. Y., 1 story, rein.-con., warehouse-film exchange, Meadow St. $100,000. Financing provided. CD 4/9—ENR 4/12, under Industrial.

Mass., Marlboro—BUS TERMINAL, etc.—Boston & Worcester Lines, Worcester Rd., Framingham, plans completed 1 story, bsmnt., 80x100 ft. bus terminal; 55x135 ft. brick, concrete, garage. Financing provided. B. Brown, 45 Franklin St., Boston, consulting engr. CD 3/22—ENR 4/5.

N. Y., New York—FACTORY—Donald Billings, 528 Bryant Ave., Zone 59, plans completed by Erhard Djorup, 1345 Chisholm St., Zone 59, 1 story, 90x125 ft. factory, Longfellow Ave. near Randall Ave. $60,000. Financing provided.

Tex., Austin — PRINTING PLANT — Steck Co., 217 W. 9 St., plans completed by C. H. Page & Son, Gracy Bldg., 7 story, 50x128 ft., rein.-con., steel printing plant addn. $100,000-$250,000. Financing provided. CD 1/15—ENR 1/25, under Commercial Buildings.

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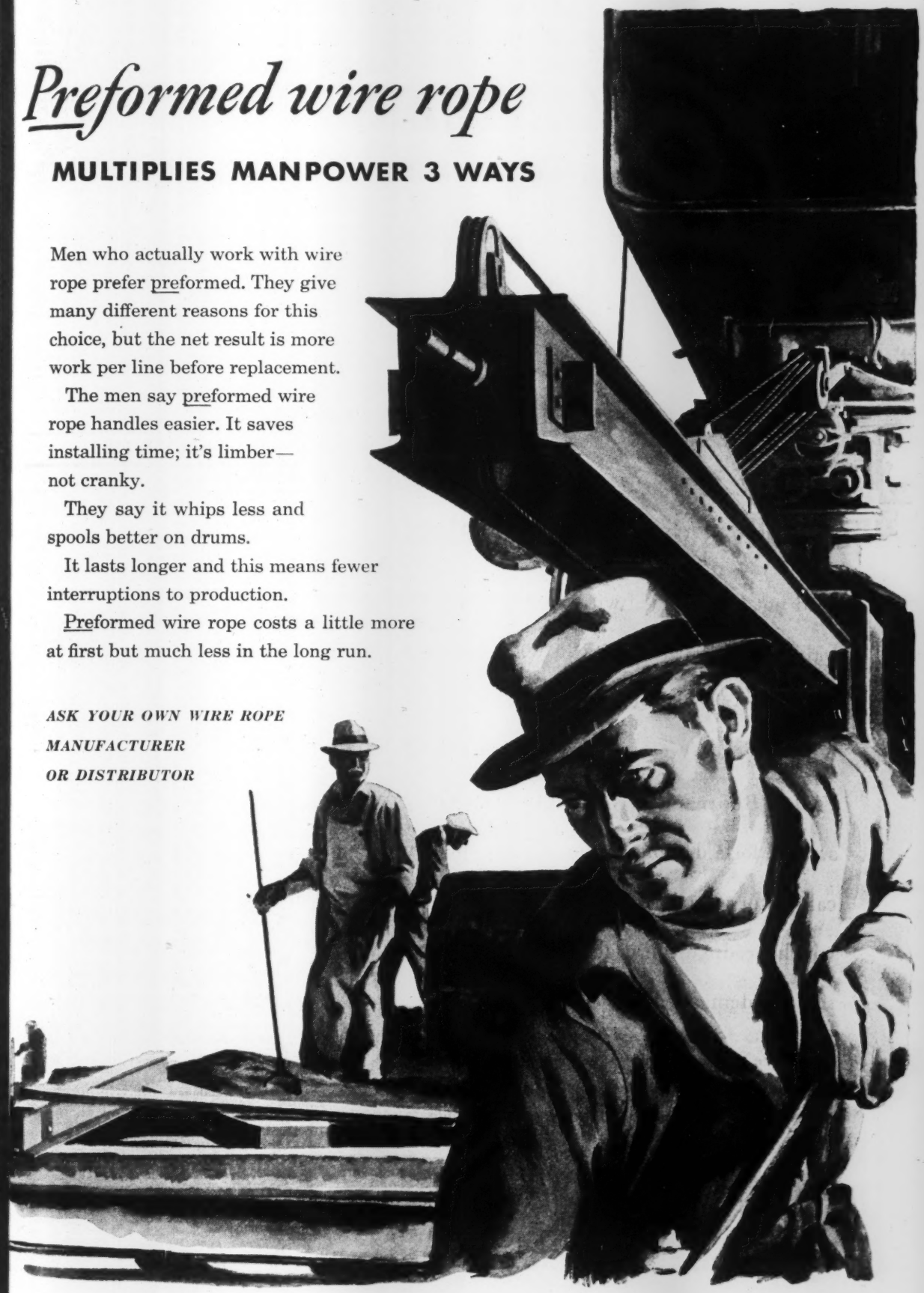

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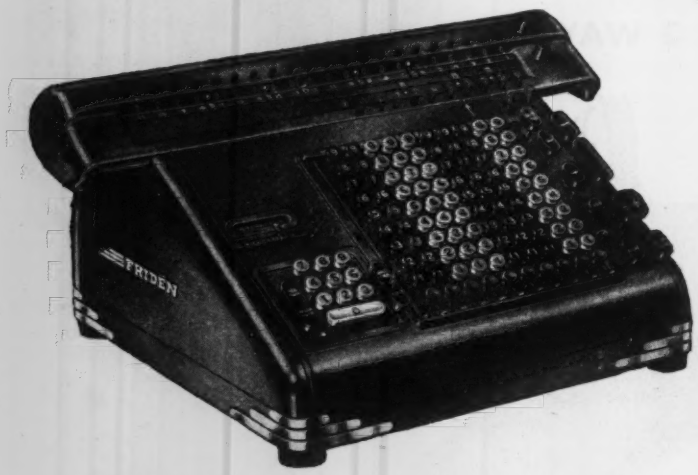

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Tex., Austin—WAREHOUSE—W. T. [illegible] Co., 200 Colorado St., plans completed 2 story, rein.-con. warehouse. **$50,000.** Financing provided. Matthews & Kenan, 1615 Transit Tower Bldg., San Antonio, consult. engrs.

CONTRACTS AWARDED

Conn., Milford — FACTORY — American Windshield Specialty Co., 442 Boston Post Rd., 1 story, 45x180 ft., brick factory, Milford Turnpike, to DeFonce Constr. Co., 119 Colonial Ave. Est. **$40,000.** CD 11/25—ENR 12/14.

Ore., Salem—PLANT—Sick's Salem Brewery, Salem, 1 story, bsmnt., 140x165 ft., rein.-con. bottling plant, to H. G. Carl, 565 E. St. Est. **$40,000.** J. H. Wohleb, Chambers Block, Olympia, Wash., archt.

Pa., Columbia—PLANT—Keeley Stove Co., J. W., Staman, pres., Columbia, plant addns., alterations, to J. Wickersham, Columbia.

ADVANCED TO ACTIVE STATUS

★**Minn., International Falls** — PLANT—Minnesota & Ontario Paper Co., 500 Baker Arcade, Minneapolis, project cancelled, filtration plant for paper mill, precipitator and filter, capacity 15,000,000 gal. per day. Over **$1,000,000.** Work now going ahead. CD 2/3/44—ENR 2/24/44.

N. Y., New York—FACTORY—Penn Bros. Realty Corp., J. B. Badovsky, pres., 420 Manida St., project cancelled 2 story, 20 x 60 ft. factory, **$56,000.** Work now going ahead. CD 5/21—ENR 5/31.

Tex., Dallas—PLANT—Adleta Show Case & Fixture Mfg. Co., 1900 Cedar Springs Rd., project cancelled plant, **$75,000.** Work now going ahead. CD 5/28.

UNCLASSIFIED

PROPOSED WORK

†**Ariz., Phoenix**—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C. National Cemetery for War Veterans, **$450,000.** Financing not provided

Calif., San Leadro—SWIMMING POOL—City, City Hall, enclosed swimming pool, **$135,000.** Financing not provided.

★**Ill., Chicago** — AIRPORT DEVELOPMENTS—City, City Hall, voted **$15,000,000** bonds, airport developments. CD 12/20—ENR 1/11.

★**Ill., Chicago** — PLAYGROUNDS, etc.—City, City Hall, voted **$2,000,000** bonds, 50 addnl. playgrounds; $24,000,000, bonds to start 10 year program for park imprvs., Chicago Park District, which would eventually cost **$60,000,000; $5,000,000** bonds slum clearance. CD 4/30—ENR 5/17.

Mass., Fitchburg—AIRPORT BLDG.—City, P. K. Dudley, chn. Comn., City Hall, combination paint and engine repair shop and 6 hangars at airport. To exceed **$50,000.**

Mass., Haverhill — RADIO STATION—Haverhill Gazette Co., 179 Merrimack St., preliminary plans under way radio station, 300 ft. tower, etc., in Ayers Hill, Newton Rd. To exceed **$25,000.**

★†**Neb., Omaha**—AIRPORT—City, City Hall, approved **$1,250,000** bond issue, municipal airport imprvs. CAA. CD 1/30—ENR 2/1, under Unclassified.

†**N. M., Albuquerque**—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., cemetery for War Veterans, **$400,000.** Financing not provided.

North Carolina—ELECTRIC LINES, etc.—Cape Hatteras Electric Membership Corp., Avon, 40 mi. lines serving 353 customers, and generator station, Dare Co. **$115,000.**

★**North Carolina**—RURAL LINES—Albemarle Electric Membership Corp., Hertford, 510 mi. rural lines, serving 2,532 customers, Perquimans Co. **$685,000.**

★†**Okla., Oklahoma City**—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans, **$1,775,000.** Financing not provided.

†**Ore., Klamath Falls**—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans, **$450,000.** Financing not provided.

★†**Ore., Portland** — CEMETERY — U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans. **$900,000.** Financing not provided.

†**Texas-Oklahoma**—PLAYGROUNDS, etc.—Dpt. Interior, National Park Service, Merchandise Mart Bldg., Chicago 54, Ill., playgrounds and recreational facilities at Lake Texoma, on Red River, near Denison, Tex., **$48,000.** Financing not provided.

Tex., Dallas—CAMP—Children's Recreation Camp, (Salesmanship Club, c/o Dallas Athletic Club Bldg., sponsors), childrens camp and playground, **$150,000.** Financing not provided.

Tex., Fort Worth—FOOTBALL STADIUM—Texas Wesleyan College, football stadium, **$35,000.** Financing not provided.

★†**Tex., Fort Worth**—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans, **$1,775,000.** Financing not provided.

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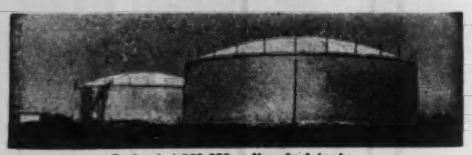

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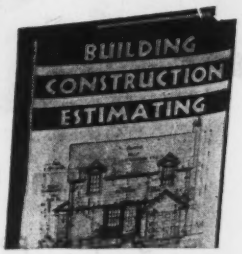

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POSTWAR PROJECTS (Cont'd.)

★**†Tex., Houston** — CEMETERY — U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans. **$1,350,000.** Financing not provided.

†Tex., Lubbock—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans, **$450,000.** Financing not provided.

†Tex., San Antonio—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery, $450,000. Financing not provided.

†Utah, Salt Lake City—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery for War Veterans, **$450,000.** Financing not provided.

Wash., Bridgeport — PARK IMPROVEMENTS—State Parks Com., Legislative Bldg., Olympia, grading, road work, kitchen construction and other development of Bridgeport State Park, **$67,500.** Financing provided.

Wash., Conconully—PARK IMPROVEMENTS—State Parks Com., Legislative Bldg., Olympia, grading, road work, kitchen construction and other development of Conconully State Park, **$27,000.** Financing provided.

Wash., Moses Lake—PARK IMPROVEMENTS—State Park Com., Legislative Bldg., Olympia, grading, road work, kitchen construction and other development of Moses Lake State Park, **$45,000.** Financing provided.

★**Wash., Seattle**—AIRPORT PASSENGER TERMINAL—United Air Lines, 4 Ave. and University St., Zone 1, passenger terminal at Seattle-Tacoma Airport. **$700,000.** Financing available.

★**Wash., Tacoma**—POWER DISTRIBUTION SYSTEM, etc.—City, City Hall, C. A. Erdahl, utilities comr., imprv. general power distr. sys., **$200,000;** Fifi Dist. Substation, **$75,000;** wood pole power transmission line from Canal St. to Tidefalts substation, **$20,000;** South Tacoma power transmission line, **$40,000.** Pearl St. substation, **$200,000;** power transmission line to Cushman substation, **$15,000;** reconductor 53 mi. La Grande-Tacoma power transmission line, **$300,000.** Financing provided. A. F. Darling, City Hall, city light supt.

†Wyo., Casper—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery, **$275,000.** Financing not provided.

†T. H., Honolulu—CEMETERY—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash. 25, D. C., National Cemetery, **$275,000.** Financing not provided.

PLANS UNDER WAY

★**Ind., Fort Wayne**—R. G. Beams, chn., Bd. P. Wks., City Hall, rerouting Nickel Plate R.R. tracks through city giving line with maximum grade of 0.6% and maximum curvature of 2 degrees. **$6,099,900.** E. J. Noonan, 188 W. Randolph St., Chicago, Ill., consult. engr. CD 8/31/43—ENR 9/2/43.

La., Bogalusa—AIRPORT— City, plans by W. R. Burk, Pan-American Bldg., New Orleans, 4-runway airport, **$134,000.** N. J. Bedell Co., Pan-American Bldg., New Orleans, consult. engr.

Mass., Beverly—FIRE ALARM SIGNAL STATION—City, Fire Dpt., Beverly, concrete, brick, steel, fire alarm signal station. To exceed **$50,000.** A. Greenlaw, c/o owner, engr.

Mass., Shirley — DAM and SWIMMING POOL—Town, G. Banks, chn. Post War Planning Comn., Town Hall, plans under way concrete dam and swimming pool. To exceed **$25,000.** H. E. Bailey, 177 State St., Boston, consult. engr.

★**N. J., Alpine**—CAMP—Boy Scouts of America, Great N. Y. Councils, 120 W. 42 St., New York 18, N. Y., plans under way 28 lean-tos, 48 winterized cabins, 6 recreation shelters, administration bldg., water supply and waste disposal sys., roads, amphitheatre, swimming pool, etc., at Boy Scout Camp, on 725 acre site, **$600,000.**

O., Columbus — PIPELINE TUNNEL—State Dpt. Welfare, State Office Bldg., large pipeline tunnel from present site of Ohio State Penitentiary to State House, State Office Bldg., and Wyandot Bldg., replacing wornout equip. **$350,000.** T. E. Brand, State Office Bldg., state archt.

★**O., Lima**—AIRPORT—City, W. L. Ferguson, mayor, City Hall, municipal airport Class 3, incl. preparation of land, paving runways, taxiways, aprons, lighting, etc. **$960,000.** Legal obstacles to be overcome. T. A. Monahan, Municipal Bldg., city engr. CD 1/10—ENR 1/25.

Ore., Salem—PARK—City, City Hall, vote June 22 for acquisition of land, city park covering 100 acres. **$300,000.** Financing not provided. J. H. Davis, City Hall, city engr.

Tex., College Station—LIGHTING DISTR. SYSTEM—City, S. B. Cook, mayor, plans 1% completed street electric lighting distr. sys. **$40,000.** Financing not provided.

Tex., Dallas — LAND DEVELOPMENT—Leslie E. Delf, 4022 Shannon Lane, plans under way estates plot development, grading paving, drainage, etc. **$50,000.**

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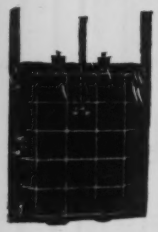

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POSTWAR PROJECTS (Cont'd.)

★**Tex., Denison**—RECREATION PROJECT—National Park Service Dpt., Dpt. Interior, 19 and F Sts. N.W., Wash. 25, D. C., plans 25% completed recreation project for 1,250 mi. shoreline of Lake Texhoma (Red River Denison Dam); incl. parks, access roads, parking areas, swimming facilities, boating and fishing facilities, cottages, etc., $500,000. Financing provided.

Tex., Denton—LIGHTING SYSTEM—City, City Hall, defeated $100,000 bonds, imprv., expanding street (electric) lighting sys. Plans new bond election soon. J. E. Ward, Harvey-Snider Bldg., Wichita Falls, consult. engr. CD 6/4—ENR 6/14.

Tex., Honey Springs (mail Dallas)—GAS LINES—Lone Star Gas Co., 1915 Wood St., Dallas, plans 50% completed natural gas lines, facilities. $25,000. Financing provided.

Tex., Plainview—AIRPORT—Town of Plainview and Hale Co., Plainview, plans 25% completed airport, incl. 2 runways, taxiway, concrete apron, hangars, administration bldg. $400,000. W. J. and R. Williams, P.O. Box 1272, archts. CD 2/13—ENR 3/8.

★**Tex., San Antonio**—AIRPORT TERMINAL—City, City Hall, plans completed by A. B. & R. M. Ayres, 3002 Transit Tower Bldg, airport terminal, incl. administration bldg., ramps, etc., $1,250,000. Financing not provided. CD 1/31—ENR 3/8.

Tex., San Antonio—SWIMMING POOL—Bd. Trustees Bexar Co., c/o C. Carter, National Bank Comm. Bldg., plans by Phelps & DeWees & Simmons, Majestic Bldg., rein.-con. outdoor swimming pool, $30,000. Financing not provided.

Tex., Tyler—AIRPORT IMPROVEMENTS—City, W. H. Knight, mayor, plans 5% completed, airport imprvs. $250,000. Financing not provided.

Wash., Bellevue—FOOTBALL FIELD, etc.—Overlake School Dist., D. E. Marsh, supt., Bellevue, plans by G. W. Stoddard, Orpheum Bldg., Seattle, Zone 1, lighted turf football field, quarter-mile track, baseball field and covered concrete stand, adjacent to high school. $50,000. Financing not provided.

Wash., South Bend—FISH HATCHERY—State Dpt. Fisheries, M. Moore, dir., Olympia, plans under way salmon hatchery on North Nemah River, near mouth of Finn Creek, $75,000. Financing provided.

★**Wash., Vancouver**—DOCKAGE, etc.—Port of Vancouver, Vancouver, 17 mi. dockage, ship turning basin and 1,200 acre airport at Lake Vancouver, involving 112,800,000 cu. yd. dredging and excav. $7,000,000. Financing not provided. J. L. Henderson, Vancouver, consult. engr. CD 1/23—ENR 4/5.

Wis., Reedsburg—AIRPORT—City, Wm. H. Dierken, clk., City Hall, airport. $25,000. Financing not provided. H. C. Amunson, Reedsburg, engr.

Alaska, Juneau—AIRPORT TERMINAL—City, City Hall, plans under way airport terminal, $200,000. Financing not provided. J. L. McNamara, City Hall, city engr.

READY FOR BIDS

★**Ind., Gary**—Bd. P. Wks., A. Dobois, secy., City Hall, plans completed intercepting sewer, laterals, Rhode Island Sewer. $910,000. Financing provided. Chas. W. Cole & Son, 220 W. La Salle St., South Bend, consult. engr. H. E. Beine, City Hall, engr.

Wash., Chelan — AIRPORT, etc. — Town, R. M. Pickett, mgr., Town Hall, plans completed airport and park, $40,000. Financing provided. G. D. Hall, Larson Bldg., Yakima, consult. engrs. CD 1/23—ENR 4/5.

ADVANCED TO ACTIVE STATUS

Missouri—RURAL ELECTRIC DISTRIBUTION LINES, etc.—Black River Electric Cooperative, E. W. Fitz, pres., Ironton, project cancelled 76.7 mi. rural electric distr. lines as 3 separate extens. in Dent, Iron, Reynolds, Washington and Wayne Counties. Work now going ahead. Michael Drazen & Associates, 4903 Delmar Blvd., St. Louis, Zone 8, engr. CD 11/16—ENR 11/30.

Tex., San Antonio—HANGAR—Union Bus Lines, c/o J. Amberson, 107 Keyton St., project cancelled, hangar. $60,000. Project now going ahead. W. N. Noonan, Travis Bldg., archt. CD 5/10—ENR 5/31.

Ont., Port Stanley—TANKS, etc.—McManus Petroleum Ltd., Port Stanley, project cancelled, tanks, etc., two 8 in. gasoline pipelines under town streets $50,000. Work now going ahead. CD 9/8—ENR 9/21.

PROJECTS CANCELLED

R. I., East Providence—HANGARS, etc.—American Aircraft, Inc., c/o Snow St. Motor Mart, 119 Snow St., Providence, project cancelled hangars, offices, runways and taxistrips at Newport Ave. To exceed $100,000. O. DiSala, 703 Gardner Bldg., Providence, archt. CD 5/16—ENR 5/31.

Tex., San Antonio—SWIMMING POOLS—City, City Hall, project cancelled, rehabilitation 5 rein.-con. swimming pools, $225,000. CD 5/26/44—ENR 6/15/44.

CONSTRUCTION REPORTS

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ELSIE EAVES, Manager *SCOTT McLEOD, Statistics* *J. A. MAHONEY, Reports*

(Daily service also available—Write for details)

WATER SUPPLY

PROPOSED WORK

O., St. Marys—City, City Hall, bids soon complete water softener plant. $120,000. F. G. Browne, Marion Bldg., Marion, engr.

O., Zanesville—City, City Hall, WW imprvs., consisting addnl. wells, laying 6- to 16-in lines in Spangler Dr., Ridge Ave. and Norval Park area, $70,000. Finkbeiner, Pettis & Strout, 1015 Home Bank Bldg., Toledo, engrs.

Tex., Abilene — W. W. Hair, mayor, preparing final plans spillway imprvs. at Fort Phantom Hill Reservoir. $30,000. Freese & Nichols, Capps Bldg., Fort Worth, engr.

Wash., Kelso — Home Owner's Water Dist., c/o Kelso Floral Co., Pacific Hy. N, soon lets contract water supply sys. with two 75,000 gal. reservoirs. $30,000. Bids 6/1 rejected. Plans deposit $5. C. O. Davolt, Courthouse, engr. CD 5/22—ENR 5/24.

Que., Dolbeau—Municipality, watermains in 2 or 3 streets. $20,000. G. Vaillancourt, Dolbeau, engr.

BIDS ASKED

Bids Asked July 6

Ky., Louisville—Louisville Water Co., 435 S. 3 St., Contr. H, pipeline construction. Contr. J, valves, sluice gates. Plans deposit $5. Alvord, Burdick & Howson, 20 N. Wacker Dr., Chicago, Ill., consult. engrs.

Bids Asked July 11

Calif., Richmond—East Bay Municipal Utility Dist., 512 16 St., St., Oakland, laying 20 in. c.i. watermain in Virginia and Standard Aves., Pro. 330. J. Longwell, ch. engr.

Bids Asked July 17

Calif., Burbank—City, City Hall, erecting 250,000 gal. welded steel water tank for City Water Dpt., Spec. 335. Over $15,000. H. I. Whites, City Hall, city mgr.

Bids Asked August 1

Fla., Miami—At office W. A. Glass, dir. Dpt. Water & Sewers, 27 N.W. Second St., enlarging water softening and purification plant. Plans deposit $10. G. A. Weigand, ch. engr., adv. ENR 6/28. CD 11/9—ENR 11/30. Under Postwar Projects.

LOW BIDDERS

†**Colo., Denver**—U. S. Eng., 909 17 St., June 30, addnl. water supply at Fitzsimmons General Hospital, from Schwartz Constr. Co., Everhart Block, Colorado Springs, $94,030. Crocker & Ryan, First National Bank Bldg., engrs.

Mass., Palmer—Town, Three Rivers Fire Dist., Three Rivers Fire Station, Palmer, June 14, watermains, and concrete fdn. for steel reservoir, etc., from R. Civitarese, 408 Metropolitan Ave., Hyde Park (Boston), $85,933. Whitman & Howard, 89 Broad St., Boston, engrs. CD 6/6.

Wash., Marietta—Pub. Water Dist. 2, c/o B. Coulthurst, 1234 Marine Dr., Bellingham, June 12, water distr. sys., incl. 55,000 ft. 2- to 8-in. pipe, from Goerig & Philp, Lloyd Bldg., Seattle 1, $109,827. Est. $100,000. CD 6/1—ENR 6/7.

CONTRACTS AWARDED

Ark., Siloam Springs—City, City Hall, imprv. WW sys., to Lippert Bros. Contg. Co., 1036 N.W. 23 St., Oklahoma City, Okla., $132,646. H. T. Lawrence, 1802 N.W. 21 St., Oklahoma City, Okla., engr. CD 5/9—ENR 5/17.

Minn., Ely—City, A. O. Knutson, clk., City Hall, water supply sys. addns., alterations, to A. F. Cherne & Sons, Eveleth, $17,933. Bids 5/22. C. Foster, 316 Medical Arts Bldg., Duluth, engr. CD 5/8—ENR 5/10.

†**Miss., Jackson**—U. S. Eng., Grant St. west of Westwood St., Mobile 7, Ala., water supply sys. addns., Foster General Hospital, Contr. W-01-076-eng-1070, to C. H. Treadwell, 1523 Centenary Blvd., Shreveport, La., $31,588.

Mont., Harlowtown—City, R. G. Johnson, clk., City Hall, water storage tank, concrete, to Cahill-Mooney Constr. Co., Billings, $19,606. Coty Eng. Co., Miles City, engrs. Bids 6/2.

N. C., Asheboro—Town, W. C. Lucas, mayor, City Hall, general contract water supply, to Wannamaker & Wells, Spartanburg, S. C., $288,175; c.i. pipe, fittings, to Hamorgan Pipe & Foundry Co., 1928 Capron St., Lynchburg, Va., $36,330. Bids 6/15. CD 6/7—ENR 6/10.

Location of ENR Correspondents

Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Name in order of Listing)

Water Supply, Sewers, Waste Disposal, Bridges, Streets & Roads, Earthwork, Waterways, Latin America, Public Buildings, Commercial Buildings, Industrial Buildings, Unclassified

Stages Reported

PROPOSED: (except Streets & Roads); BIDS ASKED (new announcements only). For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

O., Cincinnati—H. F. Wagner, city purch. agt., furnishing, laying various waterlines, Reading Md., to W. J. Conway Const. Co., 4600 Montgomery Rd., $69,389. Est $80,000. Bids 5/16. H. H. Krans, City Hall, city engr.

†**Okla., Chickasha**—U. S. Eng., 231 W. Main St., Denison, water imprvs., incl. 200,000 gal. rein.-con. storage, pump. unit for Borden Gen. Hospital, to Builders Constr. Co., 404 Perrine Bldg., Oklahoma City, $282,000. Est. $100,000. CD 6/6—ENR 6/14.

Ore., Portland—Westslope Water Dist., 9025 S.W. Canyon Rd., 1 m.g. covered concrete reservoir, to Oscar Butler & Son, 4910 N.E. 42 St., $39,802. Est. $35,000. Bids 6/11. (Correction—location of project.) CD 6/22—ENR 6/14.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., El Centro—City, City Hall, storm sewerage sys. Over $25,000. Lippincott & Rowe, 714 W. Olympic Blvd., Los Angeles, engrs.

Calif., Los Angeles—Los Angeles Co., Hall of Records, Los Angeles, 8,420 lin. ft. 8 in. vitr. clay sanitary sewer in Gephart Ave. and other streets, C.I. 1110. $30,400. A. Jones, Hall of Records, Los Angeles, engr.

Conn., Bridgeport—Dpt. P. Wks., City Hall, bids soon repairing sewage treatment plant. $100,000.

La., New Orleans—Sewerage & Water Bd., 526 Carondelet St., Contr. 226, Prentiss Ave. Drainage Canal; Contr. 136-D, Prentiss Ave. Pump Station; Contr. 158-S, sewers in vicinity of Mirabeau and Allen Sts., all between London Ave. Drainage Canal Lakefront, Peoples Ave. and Gentilly Rd.

Mass., Quincy—City Sewer Dpt., City Hall, drainage sys. addns. in Blvd. in vicinity of Colby and Milton Rds. in Atlantic. $50,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs.

Mass., South Essex—South Essex Sewage Comn., Fort Ave., Salem, pump. station and settling basin, $25,000. Legislative approval pending.

O., Barberton—City, B. A. Finefrock, city health dir., garbage incinerator.

†**Ore., Hermiston**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle 1, Wash., exten. sewerage sys. to serve 80 unit housing.

Que., Dolbeau—Municipality, sewers in 2 or 3 streets. $30,000. G. Vaillancourt, Dolbeau, engr.

BIDS ASKED

Bids Asked July 5

Colo., Grand Junction—State Purchasing Agent, State Office Bldg., Denver, 7,748 ft. 6 and 10 in. vitr. clay sanitary sewer line, 22 brick manholes with c.i. covers, for State Home for Mental Defectives, Grand Junction. $32,000. Tentative date. C. H. Coberly, 1441 Wilton St., Denver, engr.

N. Y., Binghamton—Bd. Contr. & Supply, Municipal Bldg., sewage pump. station. $30,000.

Tex., Dallas—City, E. Goforth, secy., storm sewers serving Lovers Lane from Inwood to Loma Alto, Preston Park Dr. from Amherst to Purdue and Shorecrest Dr. from Denton to Lemon.

Bids Asked July 10

Calif., Torrence—City, City Hall, 3,789 lin. ft. vitr. clay sanitary sewers in 203 St. $32,474. Plans deposit $5.

Bids Asked July 17

Calif., Los Angeles—Bd. Supervs., Los Angeles Co., Hall of Records, 1.71 mi. sanitary sewers in Live Oak St., etc. $31,700. A. Jones, Hall of Records, engr.

LOW BIDDERS

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., Hall of Records, June 19, sanitary sewers in Verdun Ave., etc. C.I. 1101, from E. Green, 3001 Coolidge Ave., $35,883. Est. $40,000. CD 5/29—ENR 6/7.

†**Calif., Oxnard**—City, City Hall, June 15, sewage disposal plant, Calif. 4-701-N, from Hoagland-Findlay Engineering Co., 3254 Cherry Ave., Long Beach, $211,400. Est. $172,000. FWA. CD 5/29—ENR 6/7.

D. C., Wash.—District Comrs., District Bldg., June 12, pipe vault drain at Bryant St. Pump. Station, from A. J. Ellis Constr. Co., 1826 Blandensburg Rd., N.E. $27,468.

D. C., Wash.—District Comrs., District Bldg., June 13, Lincoln Heights sanitary and stormwater sewer and watermain, 50 St. Fitch Place and Division Ave. N.E., from Intercounty Constr. Corp., Hyattsville, Md., $73,157.

D. C., Wash.—Dist. Comrs., District Bldg., June 18, sub-soil drain, sewage treatment plant, Blue Plains, from M. Cain Co., 3315 8 St. N.E., $26,300.

†**D. C., Wash.**—District Comrs., District Bldg., June 19, Pleasant Park stormwater sewer, 63 St. and Clay St. N.E., D. C. 49-196-N, from Intercounty Constr. Corp., Hyattsville, Md., $46,421. FWA. CD 6/13.

†**Va., Hampton**—Federal Works Agency, 18 and F Sts. N.W., Wash. 25, D. C., June 19, Hampton trunk sewer exten., Div. J, from A. Stanley Mundy & Co. Inc., 52 Main St., Woodbridge, N. J., $80,035; Div. K, from Intercounty Constr. Corp., Hyattsville, Md., $127,171***Div. L, from Norfolk Constr. Corp., 1020 N. 39 St., Norfolk. $55,516. No bids received June 19, for Div. I. CD 6/6—ENR 6/14.

CONTRACTS AWARDED

†**Idaho, Mountain Home**—City, City Hall, sewage treatment plant, with Imhoff tank and sludge drying bed, to Quinn-Robbins, 703 S. 16 St., Boise, $29,986. Est $25,000. FWA. Bids 6/12. CD 5/25—ENR 5/31.

†**Wash., Seattle**—Roxbury Heights Sewer Dist., c/o Parker & Hill, engrs., Smith Tower, 2 Ave. and Yesler Way, Zone 4, sanitary sewerage sys., disposal plant, Roxbury Heights Dist., Wash. 45-325-N, to Valley Constr. Co., 7708 Rainier Ave., Zone 8, $115,397. Est. $100,000. FWA. Bids 6/15. CD 6/5—ENR 6/7.

Welded ELEVATED STEEL WATER TANKS

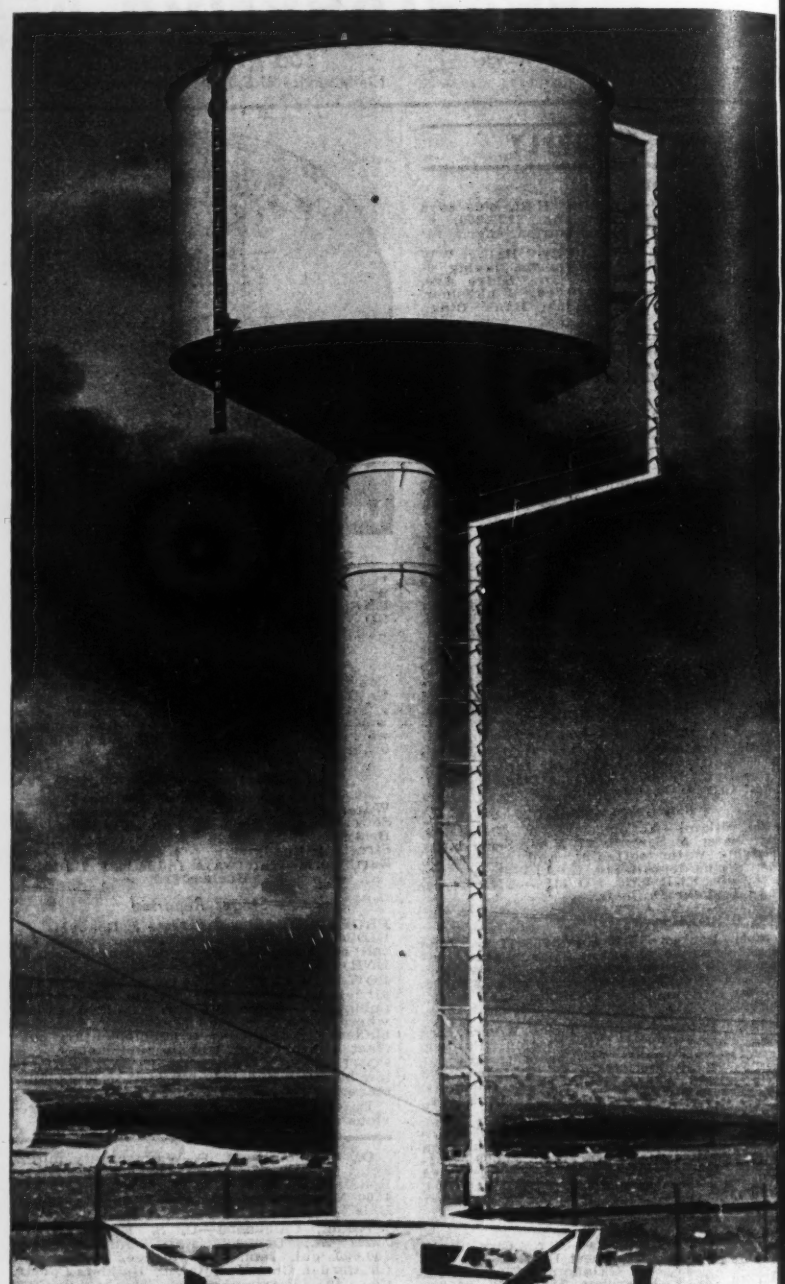
Elevated steel water tanks have been undergoing a gradual evolution for the past two decades. Since the advent of welding, this improved method of construction has been utilized in producing functional designs that are more streamlined in appearance, easier to maintain and structurally sound.

Large tanks of 500,000 to 2,000,000 gals. capacity are being built in radial-cone designs with welded cylindrical columns. Cylindrical columns are also being used on tanks with ellipsoidal bottoms and roofs in capacities up to 500,000 gals. and tanks up to 250,000 gals. capacity are being built with single cylindrical columns.

The Watersphere is a typical illustration of this latter type. The installation shown at the right is another. It is 40,000-gals. capacity, 40 ft. to bottom and provides gravity pressure for washwater at a plant in Texas.

The relatively flat cone-bottom makes for a low range in head and reduces the variation in pressure between the upper and lower water levels. Smooth surfaces make it possible to do a thorough job when painting the structure.

Write our nearest office for quotations on elevated tanks of welded construction, spherical or spheroidal tanks for pressure storage and flat bottom storage tanks of all types.



This conical-bottom elevated steel tank provides gravity water pressure for washwater service at an industrial plant in Texas. It has a capacity of 40,000 gals. and is 40 ft. to bottom.

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Tulsa 3.....1617 Hunt Bldg.
Birmingham 1.....1520 North Fiftieth Street
Greenville.....York Street
Washington 4.....703 Atlantic Bldg.
Houston 1.....5609 Clinton Drive
Los Angeles 14.....1411 Wm. Fox Bldg.
San Francisco 11.....1220 - 22 Battery Street Bldg.

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In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

BRIDGES

BIDS ASKED

Bids Asked July 5

O., Cincinnati—City, Dpt. P. Wks., City Hall, imprv. upper deck Western Hills Viaduct, remodeling expansion joints, waterproofing concrete slab, replacing sidewalks, etc. $35,424. Plans deposit $1. H. H. Kranz, City Hall, engr.

Bids Asked July 6

California—State Div. Hys., 2001 Van Ness Ave., San Francisco, constructing rein.-con. box culvert and trash rack along Ward Creek at Hayward, Alameda Co. J. H. Skeggs, dist. engr.

Bids Asked July 7

Ont., Priceville—C. W. Arnett, engr., R.R. 1, Priceville, bridge for Gleneeg Twp., Priceville. $25,000.

Bids Asked July 10

Washington—State Hy. Dpt., C. E. Hickey, dir., Olympia, rein.-con. bridge over Olequa Creek on Secondary State Hy. 12-E, Lewis Co.; repairing, reconstructing west bridge drawrest on Primary State Hy. 13, Grays Harbor Co. Plans deposit $2 each.

Bids Asked July 18

Tennessee and Arkansas—Dpt. Hys. & P. Wks. of Tennessee and Arkansas State Hy. Comn., Courthouse, Memphis, Tenn., Mississippi River Highway Bridge, Part 1, Memphis, Tenn., abutment and 7 main piers of bridge, Proj. SN-A-SN-U-FAP 607-A(2); Part 2, 10 approach piers and rein.-con. trestle of Arkansas approach to bridge, Proj. No. SN-A-SN-U-FAP 607-A(2), between Memphis, Tenn., and Crittenden Co., Ark. Plans deposit $20. Modjeski & Masters, State Street Bldg., Harrisburg, Pa., engrs.; adv. ENR 6/28. CD 3/12—ENR 3/15.

LOW BIDDERS

Missouri—State Hy. Comn., Jefferson City, June 15, bridges, Saline Co., from Cameron Joyce & Co., Keokuk, Ia., $124,805; Gentry Co., from C. E. Maxwell & Son, Columbus, Kan., $55,830. CD 6/5—ENR 6/7.

CONTRACTS AWARDED

Florida—State Rd. Dpt., Tallahassee, repairing 638 ft. bridge, Lee Co., to C. T. Felix, 1064 16 Ave. N., St. Petersburg, $57,636***1.026 ft. bridge, Nassau Co., to E. H. H. Blackwell, Graham Bldg., Jacksonville, $32,546***constructing 270 ft. bridge, Pinellas Co., to Cone Bros. Constr. Co., Caesar Ave. and Cumberland Rd., Tampa, $29,-961. Grand Total $119,543. Bids 6/14, awarded 6/23. CD 6/4—ENR 6/7.

STREETS AND ROADS

BIDS ASKED

Bids Asked July 2

Connecticut—State Hy. Dpt., Hartford, traffic-bound gravel surfacing 3,255 ft. Bujak Rd., Chaplin; 4,100 sq. ft. concrete sidewalks and about 500 ft. concrete curbing, Avon; 75 ft. channel relocation and slope construct on Naubuc Ave., Glastonbury; about 38 ft. concrete retaining wall on Silver St., in Granby.

O., Elyria—Bd. Comrs. Lorain Co., widening, resurfacing 2.13 mi. Abbe Rd., Elyria Twp. from city of Elyria to Sheffield Village, $87,730. D. E. Patterson, Elyria co. engr.

Bids Asked July 3

Ill., Rockford—City, E. Strand, clk., City Hall, sheet asphalt paving 4,088 tons Proj. 11-Cs. Over $25,000. H. S. Merz, City Hall, city engr.

Maryland—State Rd. Comn., L. H. Steuart, sec., Baltimore, Contr. No. A-370-611, furnishing, del., applying asphaltic concrete wearing course (hot mix), 0.87 mi. National Pike, through Frostburg, 2.7 mi. McMullen Hy., beginning at city limits of Cumberland and exten. towards Celanese Plant, 4 mi. Bedford Rd., beginning at city limits of Cumberland and exten. to Pennsylvania State Line; Contr. AA-354-311, del. bituminous concrete base course (hot mix), 8.48 mi. along Crain Hy., beginning at point approx. 1.2 mi. south of Glen Burnie, exten. southwesterly 0.21 mi. and beginning at point 1.25 mi. north of Dorr's Corner and exten. southwesterly 8.27 mi. to Defense Hy., all forewoing Allegany and Anne Arundel Counties; Contr. AA-355-311 2.3 mi. along Belle Grove Rd. beginning at U. S. Route 2, in Brooklyn and exten. southwesterly to Pumphrey; Contr. B-530-411, asphaltic concrete wearing course (hot mix) 0.87 mi. Dulaney Valley Rd., beginning at Towson and exten. north towards Jacksonville, 4.75 mi. Liberty Rd., beginning at Baltimore City limits and exten. to Randallstown, 5.41 mi. Hanover Rd., beginning at Montrose School and exten. to Carroll Co. line, all foregoing Anne Arundel and Baltimore Counties; Contr. F-429-611, 2.15 mi. along Urbana Pike, at several locations between Frederick and Hyattstown; Contr. P-540-511, bituminous concrete base course (hot mix) 10.33 mi. along Crain Hy. from Marlboro to T. B., both Frederick and Prince George's Counties. Plans deposit $5 each.

North Carolina—State Hy. and P. Wks. Comn., Raleigh, bituminous retreating 26.2 mi. Betterment Sects. 7-6-64-123, 7-7-64-36, Codes 5900-721-3 and 5900-707-3, Rowan Co., $25,000-$50,000; 26.2 mi. Betterment Sect. 5-6-42-131. Alamance Co., $50,000-$75,000; 27.8 mi. Betterment Sect. 5-6-46-155. Guilford Co., 25,000-$50,000; 30.1 mi. Betterment Sects. 9-6-83-125, 9-6-79-116, 9-6-82-115, Lincoln, Catawba and Iredell Counties, $50,000-$75,000; 20.8 mi. Betterment Sects. 9-6-83-126 and 9-6-79-117, Lincoln and Catawba Counties, $25,000-$50,000. W. V. Baise, Raleigh, state hy. engr.

Bids Asked July 6

Kansas—State Hy. Dpt., Junction City, resurfacing material 7.026 mi. Proj. 2643; 4.007 mi. Proj. 2674, both Clay Co.; 9.663 mi. Proj. 2652AB, Jewell Co.; 4.287 mi. Proj. 2681, Saline Co.; single asphalt surface treatment 8.483 mi. Proj. K-2128, McPherson Co.; bituminous sealing 5.281 mi. Proj. 2941; 10.159 mi. Proj. 2647, both Cloud Co.; 3.096 mi. Proj. 2673-AB, McPherson Co.; 4.873 mi. Proj. 2940, Ottawa Co.; 11.428 mi. Proj. 2664-AB, Republic Co.; 0.908 mi. Proj. 2938; 3.861 mi. Proj. 2672, both Saline Co.; bituminous surface reconstruction, etc., 11.659 mi. K-2127, bituminous material surfacing 1.606 mi. Proj. K-2106, both Geary Co. R. C. Keeling, Topeka, engr.

Bids Asked July 10

Pennsylvania—State Hy. Dpt., J. U. Shroyer, secy. Hys., Harrisburg, rein.-con. paving 16,255 ft. Leg. Rt. 120, Sec. 4-R and 5-R, Tr. Rt. 30, Braddock Twp., North Braddock, Forest Hills, Chalfant and East Pittsburgh Boros, Allegheny Co.; 4,911 ft. Leg. Rt. 52, Sec. 20, Tr. Rt. 53, Johnstown, Cambria Co.; rein.-con. patching Leg. Rts. 144, 516, 729, 23032, 23060, 23064, 23057, 23100, 418, 599, 179, 133, 225, 142, 180, 130 and 131, Appls. 1242 and 1249, Newton, Middletown, Edgemont, Upper Chichester, Lower Chichester, Haverford, Ridley, Upper Darby, Springfield, Ashton, Marple, Radnor, and Nether Providence Twps., Glenolden, Collingdale, Yeadon, East Lansadowne, Morton, Swarthmore and Trainer Boros, city of Chester, Delaware Co.; bituminous surfacing, 5,009 ft. Leg. Rt. 135, Sec. 2, Leg. Rt. 133, Sec. 1, Tr. Rt. 202, West Goshen Twp., West Chester Boro, Chester Co.; concrete widening, bituminous surfacing 12,298 ft. Leg. Rt. 88, Sec. 3-R, Leg. Rt. 367, Sec. 1-R, Tr. Rts. 6 and 177, Corry and Columbus Twp., Erie and Warren Counties; bituminous surfacing 12,161 ft. Leg. Rt. 9, Sec. 5-A and 18, Tr. Rts. 6 and 11, Scranton and South Abington Twp., Lackawanna Co.; concrete widening, bituminous surfacing, 2 rein.-con. structures, etc. 13,925 ft. Leg. Rt. 258, Sec. 3-R, Leg. Rt. 304, Sec. 4-R, Tr. Rts. 99 and 89, Edinboro Boro, Venango and Greenfield Twps., Erie Co.; bituminous on crushed aggregate surfacing 1,590 ft. Leg. Rt. 43002, Sec. 1, Shenango Twp., W. Middlesex Boro, Mercer Co.; repairing through steel truss bridge over Shenango River, Leg. Rt. 206, Tr. Rt. 322, Jamestown Boro, Mercer Co.

†Va., Yorktown—Office H. J. Speiman, div. engr. Pub. Roads Admin., 1440 Columbia Pike, Arlington, resurfacing easterly end of Colonial National Monument, near here, Va. DA-NR 77. Plans deposit $10, adv. ENR 6/28.

Washington—C. E. Hickey, dir. State Hy. Dpt., Transportation Bldg., Olympia, clearing, grading, draining, surfacing with selected roadway borrow and crushed stone surfacing, stockpiling crushed cover stone and mineral aggregate and constructing rein.-con. bridge on 4.432 mi. Secondary State Hy. 5-K, Cinebar to Bear Canyon; selected roadway borrow and crushed stone surfacing 1.26 mi. Primary State Hy. 5, Morton to Elbe; grading, draining, removing bridge, selected roadway borrow and crushed stone surfacing 0.51 mi. Secondary State Hys. 1-P and 12E, Cougar Flats school vicinity and Olequa bridge approaches, all foregoing Lewis Co.; light bituminous surface treatment 14 mi. and 23 mi. non-skid single seal treatment on Primary State Hys. 3 and 11, Stember Creek to Salmon Bar, Asotin, Franklin and Garfield Counties. Plans deposit $2 each.

Bids Asked July 11

California—State Div. Hys., Sacramento, imported borrow and plant mix surfacing 6.2 mi. portions highway between Fish Creek Rd. and Bishop, Inyo Co.; plant mix surfacing 7.5 mi. between Napa and Oakville and Santa Rosa and Beltane, Napa and Sonoma Counties; 5.3 mi. between 0.5 mi. south of Arcade Station and 2.25 mi. north of Arcade Station and between Yolo Causeway and 1 mi. west of Washington Underpass, Yolo Co.; 2.4 mi. between Gilroy and 4 mi. (southerly portions only), in Santa Clara Co.; 7.8 mi. existing road bed and on new crusher run base between Gold Run and Kingvale (portions only) Placer and Nevada Counties; plant mix emulsion seal surfacing and applying seal coat to existing surfacing 17.4 mi. between Del Rio Ave. and Templeton, Route 2, between Paso Robles and Monterey Co. line and between Estrella River and Cottonwood Pass Rd., (portions only), San Luis Obispo Co.; seal coat repairng 23.6 mi. between Route 3 and 3 mi. east of Paynes Creek, Tehama Co. G. T. McCoy,, state hy. engr. *Bids Asked July 12*

California—State Div. Hys., State Office Bldg., Los Angeles, grading, plant mix surfacing 1.1 mi. between Main St. and Sepulveda Blvd., on El Segundo Blvd., Los Angeles Co. G. T. McCoy, Sacramento, state hy. engr.

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STREETS and ROADS (Bids Asked, Cont'd.)

California—State Div. Hys., 2001 Van Ness Ave., San Francisco, grading, surfacing with crushed run base and applying seal coat outer highway between San Rafael and San Quentin Wye, Marin Co. J. H. Skeggs, 2001 Van Ness Ave., San Francisco, dist. engr.

†Maryland—Office H. J. Spelman, div. engr. Pub. Roads Admin., 1440 Columbia Pike, Arlington, Va., constructing Proj. 1B1, Washington-Baltimore Parkway, between Defense Highway and Riverdale Rd., Prince Georges Co. Plans deposit $10., adv. ENR 6/28.

Bids Asked July 13

Kentucky—State Dpt. Hys., Frankfort, bituminous resurfacing 1 mi. Bashford Manor Rd. from Barstown Rd. to Newburg, 0.7 mi. Bernheim Lane from U. S. 31W to corporate limits of Louisville, 0.9 mi. Kramer's Lane from Cane Run to Camp Ground Rds., 1.6 mi. Newburg Rd. from Bashford Manor to Shepherdsville Rds., 1 mi. Grand Lane Rd. from Ashbottom Rd. and extending southwest, 2.2 mi. National Turnpike from Third St. Rd. to 0.2 mi. south of Grande Lane, all foregoing Group R H 3 (1945) Jefferson Co.; 4.8 mi. Vanceburg-Greenup Rd., AP 68-34, Lewis Co.

Bids Asked

North Carolina—State Hy and P.Wks., Comn., Raleigh, rejected bids June 19 imprv. 26.2 mi. Alamance Co.; 27.8 mi. Guilford Co., 26.36 mi. Rowan Co.; 30.1 mi. Lincoln, Catawba, Iredell Counties, and 20.8 mi. Lincoln and Catawba Counties. Will readvertise. W. V. Baise, Raleigh, state hy. engr. CD 6/12—ENR 6/14.

LOW BIDDERS

†California—Pub. Roads Admin., 720 Phelan Blvd., San Francisco, June 21, 0.711 mi. access road, to Alameda Naval Air Station, Proj. DA-NR-73(1), Unit 3, from J. Henry Harris, 2657 9 St., Berkeley **$28,639.** Chas. Morris, div. engr.

California—State Div. Hys., Sacramento, June 20, imprv. 7.1 mi. San Joaquin Co., from A. Teichert & Co., Box 1133, Sacramento, **$43,997***1.9 mi. Mendocino Co., from W. C. Railing, 27 Lowell St., Redwood City **$26,341***6 mi. Kern Co., from Oilfields Trucking Co., Box 751, Bakersfield, **$42,090.** CD 6/1—ENR 6/7.

Calif., Santa Ana—City, City Hall, imprv. 4 St., Artesia St. to S.P.R.R. tracks, from Vido Kovacevich, 5400 Imperial Hy., South Gate, **$64,170.**

D. C., Wash.—District Comrs., District Bldg., June 14, repairing asphaltic pavements, etc., west section and furnishing 6,000 tons bituminous concrete mixture, from Corson & Gruman Co., 33 and K Sts. N.W., **$135,789 and $34,740 respectively.**

★**Illinois**—State Dpt. Hys., Springfield, June 15, from J. P. Constr. Co., Gregory Bldg., Chicago Heights, concrete pavement patching Bureau and LaSalle Counties, **$56,-008;** Bureau, LaSalle, Lee and DeKalb Counties, **$100,138;** Lee and DeKalb Counties, **$45,129*** from Eric Bolander Constr. Co., Winchester Rd., Libertyville, Lake and Henry Counties, **$63,985*** from Collignon Constr. Co., 910 Kahl Bldg., Davenport, Ia., concrete paving 3.73 mi. Livingston Co., **$367,235*** from Powers-Thompson Constr. Co., 27 S. Chicago St., Joliet, 4.26 mi. Livingston and Grundy Counties, **$447,839*** from Robert R. Anderson Co., 625 N. Kedzie Ave., Chicago, 4.18 mi. Kendall Co., **$284,478*** from Gallagher Asphalt Co., P. O. Box 173, Thornton, bituminous resurfacing 3.24 mi. Cook Co., **$63,470.**

Ill., Decatur—City, City Hall, June 14, imprv. 21.9943 mi. road, from Earl Walker & Co., Sullivan, **$27,798.** J. M. Weir, city engr. CD 6/5—ENR 6/7.

Ill., Peoria—Peoria Co., Court House, June 7, imprv. 6.027 mi. Proj. 53-1-MFT, from C. L. Swords Contg. Co., 107 S. Jefferson St., **$35,917.** E. J. Wendell, Peoria, Zone 2, engr.

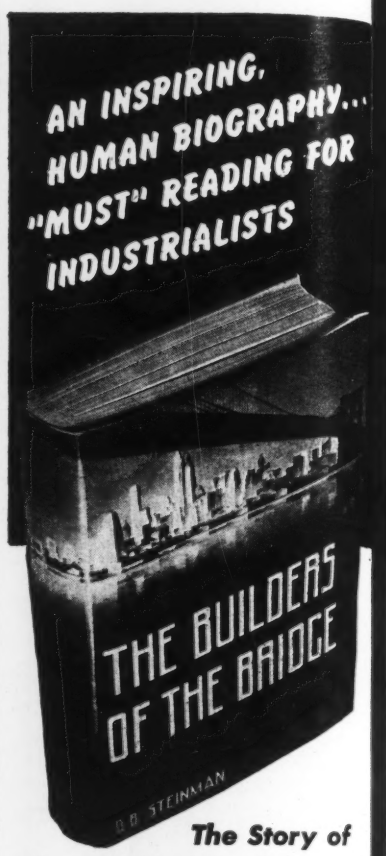
Indiana—State Hy. Comn., J. H. Lauer, chn., Indianapolis, June 19, imprv. 5.617 mi. Allen Co., from Moellering Constr. Co., 241 Murry St., Fort Wayne, **$364,861.** Est. $379,-910. CD 6/8—ENR 6/14.

Louisiana—State Hy. Dpt., D. W. Smith, dir., Baton Rouge, June 13, imprv. 266.8 mi. Rapides Parish, from Carruth Contg. Co., Louisiana National Bank Bldg., Baton Rouge, **$54,206;** 201.4 mi. Grant Parish, from W. R. Aldrich & Co., Kalwah University Gardens, Baton Rouge, **$83,944.** CD 5/23—ENR 5/31.

Mich., Midland—City, City Hall, June 5, imprv. Jefferson Ave., Contr. 1, grading, curbing, guttering, 9,800 cu. yd. graveling, etc., from Bridgeport Core Sand Co., 125 Davenport St., Saginaw, **$78,173;** Contr. 2, 390 tons Type B regular surface Laykold pavement, from Midland Contg. Co., 206 E. Main St., **$28,835.** CD 5/25—ENR 5/31.

Missouri—State Hy. Comn., Jefferson City, June 15, imprv. 2.068 mi. Saline Co., from Cameron-Joyce & Co., Keokuk, Ia., **$225,919 ***1.356 mi. Greene Co., from Koss Constr. Co., 205 Old Colony Bldg., Des Moines, Ia., **$63,589***0.391 mi. Jackson Co., from J. A. Tobin Constr. Co., 3700 Rainbow St., Kansas City, Kan., **$41,731.** CD 6/5—ENR 6/7.

★**Pennsylvania** — Dpt. Hys., Harrisburg, June 22, impr. 1.77 mi. Berks Co., from E. J. Breneman, Inc., Pottstown, **$83,404*** 5.47 mi. Cambria Co., from Mayer Bros. Constr. Co., 1225 W. 28 St., Erie, **$173,689*** 1.2 mi. Chester Co., from Bitu-Rock Corp., 1518 Walnut St., Phila., **$33,170;** 3.92 mi. Lawrence Co. from Kelley & Meyer Co., Dollar Bank Bldg., Youngstown, O., **$33,519**



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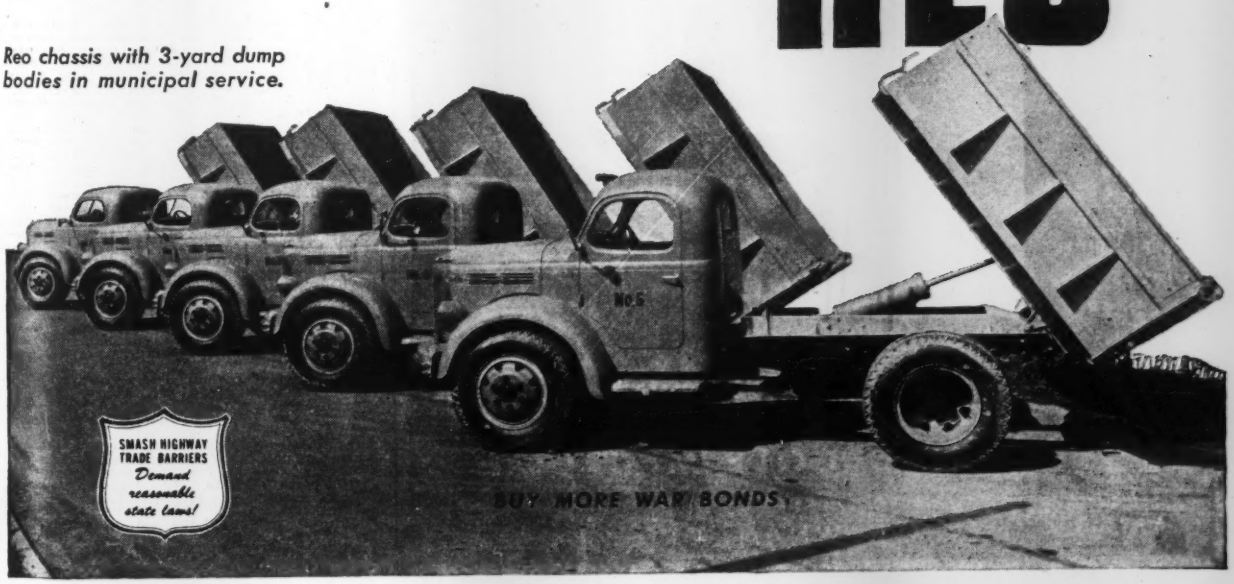

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STREETS and ROADS (Low Bidders, Cont'd.)

3.39 mi. Lycoming Co., from Hanford Bros. Constr. Co., Emporium, $90,83193,-964 sq. yd. hy. Philadelphia and Montgomery Counties, from Barrett Paving Co. Inc., 51 W. State St., Trenton, N. J., $50,649*** 4.3 mi. Schuylkill Co., from Alstate Constr. Co., 313 Chestnut St., Harrisburg, $178,389. CD 6/12—ENR 6/14.

★**Texas**—D. C. Green, engr. State Hy. Comn., Austin, June 21, from Southern Contg. Co., 2525 Harris Blvd., Austin, imprv. 3.892 mi. Collin Co., $97,172; 4.796 mi. Jefferson Co., $54,506; 5,669 mi. Navarro, Ellis and Dallas Counties, $79,596***from Heldenfels Bros., Rockport; 7.173 mi. Nueces and Jim Wells Counties, $42,759*** from Cagle & Proctor, Dupont St., Houston, 26.119 mi. Jackson and Wharton Counties, $226,687; 4.635 mi. Harris Co., $79,699***from H. Page, Fiskville Rd., Austin, 33.89 mi. Leon and Madison Counties, $336 161; 6.368 mi. Ellis and Kaufman Counties, $38,973***from C. Hunter Strain, San Angelo, 15.245 mi. Lavaca and Jackson Counties, $25,861. CD 6/12—ENR 6/14.

Tex., Houston—Cty, M. H. Westerman, secy., June 20, surfacing various streets, from Brown & Root, Inc., P. O. Box 3, $80,772.

Wis., Milwaukee—City, A. H. Hempe, ch. clk., June 15, 8 in. rein.-con. paving S. 15 Pl., S. 14 and S. 15 Sts. from Bodemann Const. Co., 2803 N. 55 St., Zone 10, $29,349. J. P. Schwada, city engr.

CONTRACTS AWARDED

Ala., Mobile—Bd. Revenue Mobile Co., Court House, imprv. 1.5 mi. road adjoining city of Mobile, to F. L. Bray Constr. Co., 107 Elmira St., $43,167. CD 6/6.

★**Florida**—State Road Dpt., Tallahassee, to J. D. Manly Constr. Co., Leesburg, imprv. 7.8 mi. Hernando Co., $31,264; 4.115 mi. Hardee Co., $35,253; 62.057 mi. Hardee and DeSoto Counties, $38,628; 45.776 mi. Lake and Marion Counties, $61,848***to Brinson Constr. Co., 1st National Bank Bldg., Tampa, 2,761 mi. Volusia Co., $53,116; 8.038 mi. Volusia Co., $93,922; 7.11 mi. Highlands Co., $83,777***to Belcher Oil Co., 1221 Bisc. Blvd., Miami, 1.515 mi. Okeechobee Co., $41,599*** to A. B. Covell, DeFuniak Springs, 7.915 mi. Jackson Co., $78,829***to R. T. Gordon, 2077 W. Beaver St., Jacksonville, 14.295 mi. St. John's Co., $79,796***to R. H. Wright & Son, Fort Lauderdale, 7.325 mi. Brevard Co., $137,540***to L. L. Hall Constr. Co., 2790 Forbes St., Jacksonville, 1.878 mi. Seminole Co., $30,743***to W. H. Armston & Co., Inc., Dunedin, 8.384 mi. Pinellas Co., $34,559*** to Cone Bros. Constr. Co., Caesar Ave. and Cumberland Rd., Tampa, 8.067 mi. Manatee and Sarasota Counties, $53,894. Grand total, $853,968. CD 6/4—ENR 6/7.

Ia., Hampton—Bd. Supervs., Franklin Co., Hampton, maintenance, construction surfacing various roads, surfacing material from pits in north part of county to Maudlin Constr. Co., Webster City, $32,661; various roads, hauling surfacing from all pits except north three pits, to Paul Constr. Co., Fort Dodge, $35,382. Awarded 6/19. C. P. Rudisill, Hampton, co. engr.

★**New Mexico**—State Hy. Dpt., Santa Fe, imprv. 15 mi. Roosevelt Co., to Henry Thygesen & Co., Box 876, Albuquerque, $25,-834; 14.6 mi. Sandoval and Rio Arriba Counties, and 13.055 mi. Sandoval Co., to Brown Brothers, 3425 N. 4 St., Albuquerque, $302,180 and $270,356 respectively. Grand total, $598,370. Bids 6/22. CD 6/14.

★**New York**—Dpt. P. Wks., Albany, imprv. 22 mi. Chautauqua Co., to Warren Bros. Road Co., 38 Memorial Dr., Boston, Mass., $583,323. CD 4/13—ENR 4/26, under LB.

★**North Dakota**—State Hy. Dpt., Bismarck, to W. H. Noel Co., Jamestown, imprv. 25.06 mi. McKenzie Co., $38,017; hys. Billings, Stark, Morton, Burleigh and Kidder Counties, $72,200; 2.992 mi. Morton and Sioux Counties, $45,575***to Haggart Constr. Co., Fargo, 94.069 mi. Rolette and Towner Counties, $91,845*** to Summit Constr Co., Rapid City, 138.513 mi. Logan and McIntosh Counties, $84,695***to A. Campbell, Warwick, 3.554 mi. McKenzie Co., $66,532***to Rue Constr. Co., Bismarck, 2.992 mi. Morton and Sioux Counties, $38,075*** to Wm. Coman & Son, Bismarck, 19.308 mi. Stutsman Co., $45,461*** to Northern Improvement Co., Fargo, 19.386 mi. Morton Co., $334,231. Grand total $817,630. Bids 6/15. CD 6/5—ENR 6/7.

O., Dayton—Bd. Comrs. Montgomery Co., Dayton, surface treating various roads, to R. Kammer, 225 N. Western Ave., $264,619. Bids 5/3. A. Bakos, Dayton, co. engr.

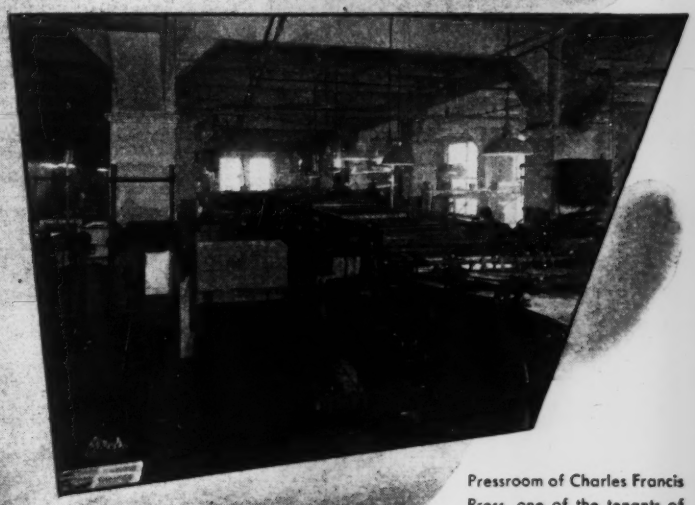
O., Bowling Green—Bd. Comr. Wood Co., bituminous resurfacing 160 mi. roads, $130,000, patching and repairing 750 mi. roads, $50,000, own forces. M. Berry, co. engr.

O., Celina—Bd. Comrs. Mercer Co., bituminous resurfacing 50 mi. roads, $40,000; gravel or stone resurfacing 150 mi. roads, $25,000, own forces. Z. M. Flaler, co. engr.

O., Eaton—Bd. Comrs. Preble Co., bituminous resurfacing 76 mi. roads, own forces. $43,815.

Oklahoma — State Hy. Dpt., Oklahoma City, grading, etc. 12.2 mi. Lexington Co., to Mullinix Const. Co., 1405 NW 5 St., Oklahoma City, $37,420 est. $38,000; 0.718 mi. Garvin Co., to J. A. Briscoe, Stillwater, $40,937 est. $42,000. Bids 6/12, awarded 6/13.

The Printing Crafts Building, 461 8th Ave., N. Y., filled the printer's need for light, air and freedom from vibration.



Pressroom of Charles Francis Press, one of the tenants of the Printing Crafts Building.

When the printing industry went skyward

The tremendous weight and speed of modern printing presses require substantial, vibration-free floors . . . a real test for reinforced concrete. The problem became acute in New York where high realty values have made tall buildings a necessity.

The printing industry went skyward in 1915, when the 23 story Printing Crafts Building was erected. In its construction specially designed connections locked the entire steel framework into a rigid, vibrationless structure, while the 500,000 square feet of Clinton Welded Fabric used in the floors provided the strength necessary to stand the strain of rapidly operated, heavy presses.

In this building, as in thousands of structures built since its invention in 1902, Clinton Electrically Welded Fabric is providing endurance to concrete, with a minimum of maintenance. Characterized by its perfect wire and welds, uniformity, and high tensile strength, Clinton Fabric is the choice of many leaders in the construction field. Try it on your next reinforced concrete job.

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ABILENE • BOSTON • BUFFALO • CHATTANOOGA • CHICAGO • CLINTON (MASS.) • DETROIT • HOUSTON • LOS ANGELES
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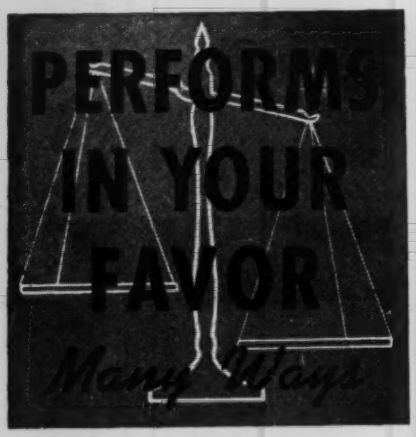

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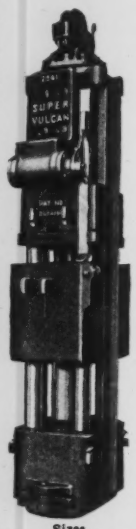
PILE HAMMERS
18C, 30C, 50C and 80C

• The Super-VULCAN gives you all around pile driving efficiency. You save in steam costs as the Super - Vulcan uses 25% to 35% less steam per blow. You get twice the usual blows per minute which gives you a time advantage. Forceful blows give you greater penetration which again is a factor in time saving. Compactness makes possible easier operating. Rugged strength, simple design, and positive action saves on maintenance and attention.



Sizes
18C—30C—50C—80C
meet all needs

The open type fits the same leads and uses the same accessories as the VULCAN Single-Acting Pile Hammer.

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago 12 ---Illinois

STREETS and ROADS (Contracts Awarded, Cont'd.)

O., Portsmouth—Bd. Comrs. Scioto Co., gravel or stone resurfacing 100 mi. roads, patching and repairing 40 mi. roads, own forces, **$30,750.** O. C. Barklow, co. engr.

O., Port Clinton—Bd. Comrs. Ottawa Co., bituminous resurfacing 32 mi. roads, own forces, **$50,000.** D. J. Nissen, co. engr.

O., Tiffin—Bd. Comrs. Seneca Co., bituminous resurfacing 65 mi. roads, **$45,000,** patching and repairing roads, **$104,000,** own forces. W. H. Heim, co. engr.

EARTHWORK, WATERWAYS

PROPOSED WORK

Tex., Newton—Earl C. Hankamer & Sons, Commerce Bldg., Houston, grounds preparation for 80,000 acre pine reforestation project. $100,000.

BIDS ASKED

Bids Asked July 3

†Arkansas, Mississippi and Missouri—U. S. Eng., P.O. Box 97, Memphis 1, Tenn., approx. 5,913,000 cu. yd. earthwork in Lower St. Francis and Upper Yazoo Levee Dists., at Hickman, St. Thomas, Devils Elbow and Gammon, Ark., Concord and Gayoso Bend, Mo., and Lake Cormorant, Penton, Clack and Below Commerce, Miss.

Bids Asked July 6

Minn., Waseca—Waseca Co., A. Brisbane, aud., constructing County Ditch 23. **$17,890.** G. Cox, Waseca, engr.

Bids Asked July 9

Calif., Nevada City — Nevada Irrigation Dist., Grass Valley, constructing foundation or first stage of Scotts Flat Dam, 4.5 mi. east of here. Plans deposit $5 not returnable. Blackie & Wood, 544 Market St., San Francisco, engrs.

Bids Asked July 20

†Colo., Kremmling—Bureau Reclamation, Denver, widening State Hy. 9, Green Mountain Reservoir, Colorado-Big Thompson Proj., 16 mi. south of here, Spec. 1809-D.

CONTRACTS AWARDED

†California—U. S. Eng., 74 New Montgomery St., San Francisco, Zone 19, dredge pipe trestle at California Point, to J. D. Proctor, Box 247, Pt. Richmond Station, Richmond, **$57,868.**

★ **†California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 55, (1st section) approx. ½ of Lytle Creek Channel, Warm Creek to Foothill Blvd., San Bernardino Co., rein.-con. channel, 1,181,000 cu. yd. excav., 624,000 cu. yd. fill, 140,000 cu. yd. concrete etc., No. 104, to Bressi-Bevanda Constructors, Inc., 208 W. 8 St., and Macco Constr. Co., 815 Paramount Blvd., Clearwater,, **$2,528,350.** Bids 6/12. CD 5/9—ENR 5/17.

†Idaho, Mountain Home—Bureau Reclamation, Court House, Denver, Colo., 27,000 bbls. modified Portland cement in for bulk reclamation proj., Inv. 22,642-A, to Oregon Portland Cement Co., Portland, **$74,032.** Bids 5/9.

†Louisiana—U. S. Eng., foot of Prytania St., New Orleans, 1,985,000 cu. yd. compacted earthwork on South Bank Red River Levees, in Rapides and Avoyelles Parishes, Sol. 16-047-45-161, to W. C. Sheppard Co., P. O. Box 3299, Station F, Atlanta, Ga., **$466,475.** Awarded 6/15.

†Tex., Cameron—U. S. Eng., Avenue F and 25 St., Galveston, levee repairs, Brazos River Imp. Dist. C1-14, to B. G. Burnett, 501 W. Acheson St., Dallas, **$21,945.**

†Tex., Galveston—U. S. Eng., 25 St. and Avenue F, dredging Intracoastal Waterway, (C1-15) from Colorado River to Matagorda Bay, to Standard Dredging Corp., 80 Broad St., New York, N. Y. **$76,043.**

LATIN AMERICA

Brazil, Galaleo—Republic of Brazil, Rio de Janeiro, plans bridge over Guanahara Bay, to connect with mainland. $225,000. Ministry of Works, Rio de Janeiro, engr.

Bolivia—Bolivian Dpt. Irrigation, La Paz, plans constructing Rio Viscahani Dam, Dpt. La Paz; Rio Tacagua Dam, Province Chollapata; Rio Desaguadero Dam, Dpt. Oruro; Rio Pilcomayo Dam, Dpt. Tarija.

Bolivia, La Paz—Republic of Bolivia, La Paz, plans canalization of Choqueyapu River between Capriles bridge and junction of Calocoxa River. $700,000. Dpt. Works, La Paz, engr.

Chile, Santiago—Public Works Bureau, engrs., Santiago, taking bids constructing Pan-American Hy. between Santiago and La Serena, for Republic of Chile, Santiago. Over $2,000,000.

Columbia, Bogota—Hotel Granada Corp., Bogota, working drawings by P. R. Williams, 3757 Wilshire Blvd., Los Angeles, Calif., U. S. A., 14 story, steel frame, rein.-con. hotel addn. $2,000,000.

Colombia, Medellin — Cia. Suramericana DeSeguros, Medellin, sketches by P. R. Williams, 3757 Wilshire Blvd., Los Angeles, Calif., U. S. A., 14 story, steel frame office and apartment. $1,500,000.

Here it is, the NEW 1945 edition! Forty pages of complete information on Kinnear upward acting doors for every purpose. Kinnear Rolling Doors feature a sturdy, flexible, steel-slat curtain and coiling upward action. Kinnear sectional type doors are also presented. Send for your FREE copy!

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OUTDOOR WATER SERVICE DEVICES
Interchangeable Inner Parts

Exact machining of working parts makes interchange of parts possible.
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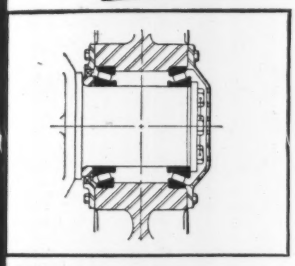

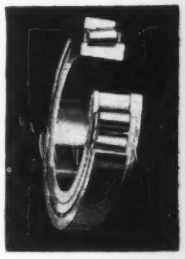

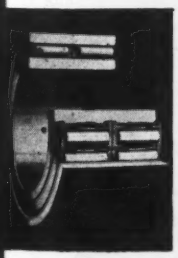

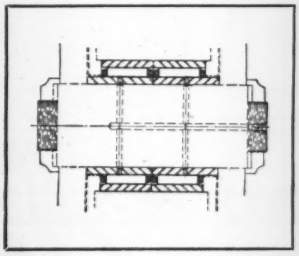

X-section and cutaways show specially designed bearings for floating span of world's longest floating bridge. Torrington's Bantam Bearings Division designs and builds many bearings for bridges, dams, lock-gates and other heavy-duty applications.

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The 8 specially designed single row Tapered Roller Bearings used on the vertical guides measure 10½" I.D., 16" O.D., and have a capacity of 331,000 pounds each at 14.3 RPM. Horizontal guides use 8 specially designed double-row Straight Roller Bearings, measuring 10" I.D., 15¾" O.D., and rated at 450,000 pounds each at 14.3 RPM.

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Sika STOPS LEAKS Fast!

...And Simply, Too!

Sika quick-setting concrete compounds can be used to seal any concrete structure against leaks from the inside, against pressure. The Sika method is quick, sure and long-lasting.

Here is all you need do:

1. Hack or sandblast surface and clean thoroughly.
2. Divert water to large bleeder holes. (This is done by sealing smaller leaks with quick-setting mortar. For trowel coats use Sika No. 4A; for guniting, use Gunite Sika.)
3. Plug bleeders with extremely fast-setting Sika No. 2.

After all leaks have been sealed, apply a protective cement coat over entire surface to prevent future leakage. As water-resisting compound use Sika No. 1 for trowel application, or Gunite Sika for gunite work.

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41 Gregory Ave. • Passaic, N. J.

Manufacturers of

Compounds for Concrete Problems • Plastiment, The Concrete Densifier

PUBLIC BUILDINGS

BIDS ASKED

Bids Asked June 30

★ †**Pa., Mechanicsburg** — Yards & Docks, Navy Dpt., 78 St. and Constitution Ave. N.W., Wash. 25, D. C., 5 storehouses, 2 platforms, retaining walls, sanitary sewers and storm water sewers, water distr. sys., railroad trackage, 9,000 ft. electrical distr. sys. at Naval Supply Depot, NOY 11794, $4,500,000. Gravell & Minick, 112 S. Main St., archts.

Bids Asked in July

†**Mo., Rock Hill (br. St. Louis)**—Rock Hill School Dist., T. D. Adams, supt., 9420 Manchester Rd., Rock Hill, St. Louis, Zone 17, 1 story, bsmnt., 3-room school, Warson Rd. and O'Day Ave. $58,650. FWA. E. T. Friton, Security Bldg., 4 and Locust Sts., St. Louis, Zone 2, archt. CD 6/4—ENR 6/7.

Bids Asked July 3

†**Mo., Kirkwood**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., removing, replacing promenade deck roof at U. S. Marine Hospital.

Bids Asked July 7

La., Tullos—LaSalle Parish School Bd., J. D. Russell, Jr., supt., Jena, 1 story, brick school. Plans deposit $25. C. Scott Yeager, Alexandria, archt.

Bids Asked July 10

★ †**Ala., Mobile**—City, City Hall, Chas. A. Baumhauer, mayor, hospital alterations, addns., Ala. 1-295. $500,000. FWA. T. Cooper Van Antwerp, 216½ S. Francis St., archt. CD 6/11—ENR 6/21.

★ **Minn., Faribault**—State, Dpt. Admin., M. S. Cooper, dir. Purchases, 19 State Capitol, St. Paul, four 2 and 3 story, reinf. con., brick, tile bldgs., consisting 2 infirmary and 2 custodial, at School for Feeble Minded. $877,000. Plans deposit $25. H. H. Crawford & P. P. Bross, Rochester, and Ellerbe & Co., 1021 E. First National Bank Bldg., St. Paul, archts. CD 5/16—ENR 5/24.

Bids Asked July 11

†**Va., Norfolk**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., 13 classroom school, at Alexander Park, Va. 44-436, FWA. Extended date. J. B. Walford, 2[illegible] Cary St., Richmond, Zone 19, archt. CD 6/6—ENR 6/14.

Bids Asked July 13

Ark., Benton—Bd. Trustees Arkansas State Hospital, Markham and Elm Sts., Little Rock, hospital. Plans deposit $50. Brueggeman, Swaim & Allen, 331 Gazette Bldg., Little Rock, archts.

Bids Asked July 16

†**Ala., Enterprise**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., 1 story recreation bldg., Ala. 1-268. C. C. Pearson, 220 First National Bank Bldg, Montgomery, archt. CD 6/7—ENR 6/14.

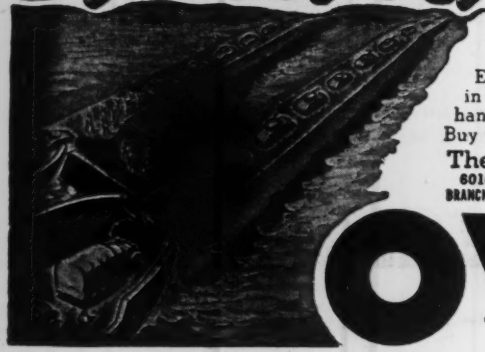
LOW BIDDERS

†**Calif., Hunters Point** — Pub. Housing Auth., NHA, 760 Market St., San Francisco, June 20, 117 family dwelling units, Calif. 4155, from Theodore G. Mayer, 200 Quint St., San Francisco, $252,759. CD 6/7—ENR 6/14.

†**Calif., Hunters Point**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, June 16, 107 portable dwelling units, Calif. 4154, from DeLuca & Son, 1745 Filbert St., San Francisco, $255,600. CD 6/7.

†**O., Dayton**—U. S. Eng., 522 U. S. Post Office and Courthouse Bldg., Cincinnati, Zone 1, automotive repair bldg., at Patterson Field, incl. excav., concrete work, masonry, from Frank Messer & Son, 2515 Burnet Ave., Cincinnati, $61,542.

Speed Up HANDLING OPERATIONS



Ingenuity in developing amazing portable docks speeded the invasion of Europe. Similarly inbuilt features of design in Owen Buckets speed up the digging and handling capacities of these popular buckets. Buy Owens for resultful operation.

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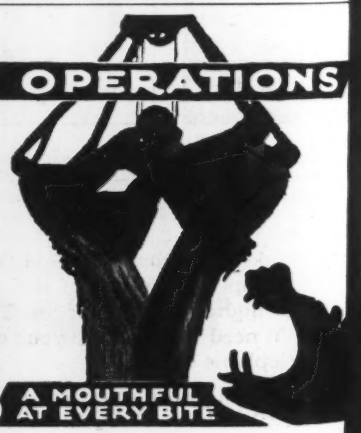

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REINFORCING STEEL—Bethlehem Bar Mats, made of deformed bars clipped together, are easy and convenient to install, and lie flat.

HIGHWAY GUARD—Bethlehem's beam-type guard rail, called the Safety-Beam, is made in standard 12 ft., 6 in. lengths, or can be supplied in lengths up to 50 ft.

BETHLEHEM STEEL

BETHLEHEM PRODUCTS FOR HIGHWAYS

THERE'LL be a great army at work—perhaps as many as 7,000,000 men—when postwar highway and bridge building gets under way.

Your district will have its part in this big, constructive peacetime push. You may have already figured out your manpower needs, and how your logistics—the fine art of keeping supplies moving to the front—will work out.

Make Bethlehem the G.H.Q. for your road and bridge steel needs. Bethlehem can supply every one of the many steel items needed to build a modern concrete highway, and bridges. There's a Bethlehem warehouse near you, and all you'll need to do to get your complete road steel order moving fast is to put in a telephone call.

For full information get in touch with the nearest Bethlehem district office, or write direct to Bethlehem Steel Company, Bethlehem, Pa.

Road Joints • Center Strip • Dowels Dowel Bar Supports • Reinforcing Bars Bar Mats • Bar Ties • Reinforcing for Concrete Pipe • Bridge Floor Reinforcing • Concrete Slab Spacers • Welded Wire Fabric • Guard Rails • Guard Posts and Brackets • Wire Rope and Strand • Right-of-Way Fence and Posts Anchor Rods • Pipe • Hollow Drill Steel Digging Bars • Structural Steel • Mold Boards • Corrugated Sheets • Turnbuckles • Tie Rods, Spikes, Bolts and Nuts • Timber Bridge Hardware Sheet and H-Bearing Piling

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All shapes and sizes of structures—made of steel or steel alloys in welded or riveted constructions; and furnished as shop or field-erected units. Send us blueprints and specifications if available—or give detailed description of requirements.

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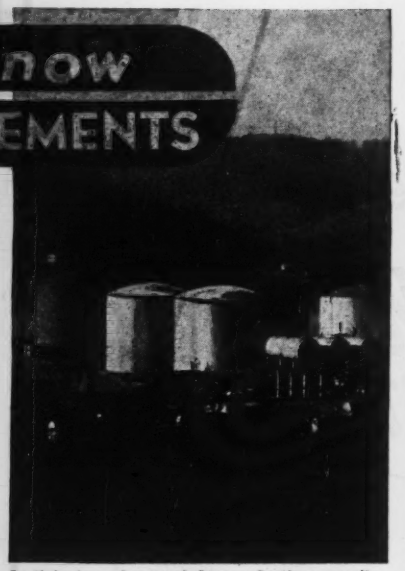

Partial view of several Stacey Brothers gasoline storage tanks installed along the Ohio river.

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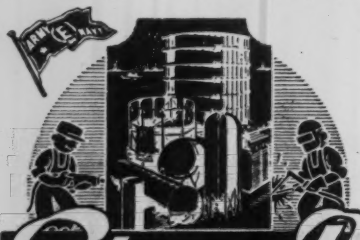
STORAGE and PROCESSING
TANKS



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NO PROJECT TOO LARGE—NONE TOO SMALL

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Electric Welded Steel Pipe — *FOR PERMANENT INSTALLATIONS*

Easy to Install · · High Capacity · · Dependable · · Long-lasting

American Locomotive
ALCO PRODUCTS DIVISION
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PUBLIC BUILDINGS (Cont'd.)

CONTRACTS AWARDED

★**†Calif., Oakland**—U. S. Eng., 74 New Montgomery St., San Francisco, Postal Concentration Center No. 2, Oakland Army Base, Spec. 2124-1, to MacDonald & Kahn, Inc., 200 Financial Center Bldg., San Francisco, **$1,430,841.** CD 4/26—ENR 5/3.

†Calif., San Bernardino—U. S. Eng., 751 S. Figueroa St., Los Angeles, processing bldg., at G. W. S. Plant, No. 322, to Baruch Corp., 625 S. Olive St., Los Angeles, approx. **$130,000.**

†Ind., Gary—Bd. School Trustees, C. D. Lutz, supt., 524 Garfield St., 2 story, bsmnt., brick, rein.-con. high school addn., Ind. 12-226, to M. Gerometta, 515 Bway., **$257,500.** FWA. Bids 6/14, awarded 6/16. CD 6/1—ENR 6/7.

★**†Mass., Camp Edwards**—U. S. Eng., 31 St. James Ave., Boston, Zone 16, convalescent hospital addn., Contr. 19-023-45-Neg-151, to John Bowen Co., 129 Newbury St., Boston, **$825,660.**

†Neb., Grand Island—U. S. Eng., 909 17 St., Denver, Colo., magazine, load lines and barricades, Cornhusker Ordnance Plant, Contr. W-05-016-eng-343, to Arnold Swanson & Co., Kearney, **$48,058.**

†N. Y., Scotia—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., miscellaneous bldg. addns., N. S. D., NOY 12064, to O'Driscoll Constr. Corp., 347 Madison Ave., New York, Zone 17, **$178,400.** CD 5/29.

†Penn., Milan—U. S. Eng., Grant St., west of Westwood St., Mobile 7, Ala., modifications and addns. to load line, Wolf Creek Ordnance Plant, Contr. W-01-076-eng-1066, to C. G. Kershaw Contg. Co., 2212 20 Ave., S., Birmingham, Ala., **$90,800.**

†Tex., Fort Sam Houston—U. S. Eng., Fort Sam Houston, conversion 12 bldgs. into mess halls, pastry shop, outside utilities, air conditioning, etc., conversion bldg. into refrigeration repair shop, Serial No. W-41-154-45-89, to Cunningham & Dinn, 1119 N. Mesquite St., San Antonio, **$155,494.** CD 6/1—ENR 5/7.

†Tex., Fort Sam Houston—U. S. Eng., Fort Sam Houston A. G. and S. F. Redistribution Station Area 1, conversion, expanding, etc. army bldgs., Serial W-41-154-45-149, to J. C. Worcester, P. O. Box 5066, San Antonio, **$262,446;** three 117 x 143 ft. recreation bldgs., Serial W-41-154-45-163, to Port Constr. Co., P. O. Box 910, Brownsville, **$138,997.** CD 5/25—ENR5/31.

Tex., Port Lavaca—City, F. M. Dudgeon, mayor, City Hall, 3 story, rein.-con., brick cold storage and quick freeze plant, to Thos. Bate & Son, 1107 Girard St., Houston, **$36,666,** Garrett Engineering Co., 1804 Milam St., Houston, engr. CD 5/29—ENR 6/14, under Postwar Projects.

†Utah, Ogden—U. S. Eng., 580 S. State St., Salt Lake City, steam plant, steam distr. sys., heating sys., engine servicing rooms in warehouses, paving, drainage around utilities at Ogden Air Depot, to M. Morrin & Son, 259 Harrisville Rd., **$43,593.** Bids 6/9.

★**Que., Verdun**—Verdun General Hospital, La Salle Blvd., 2 addnl. extens. for 150-bed hospital, to Concrete Constr. Co., Ltd., 1083 Decarie Blvd., Montreal, **about $500,000.** S. Brais, 1084 St. Denis St., Montreal, archt.

COMMERCIAL BUILDINGS

BIDS ASKED

Bids Asked in June

★**O., Maumee**—Anthony Wayne Developing Co., G. H. Burrows, pres. and archt., 13124 Shaker Sq., Cleveland, 2 story, 100x400 ft., brick, concrete, stone, steel recreation and shopping center, incl. theatre bldg., bowling alleys, department store, etc. $500,000. CD 5/15—ENR 5/17.

Bids Asked July 9

Neb., Scottsbluff—Chas. D. Strong, archt., C. A. Johnson Bldg., Denver, Colo., theatre rebuilding, for W. H. Ostenberg, Box 801. $75,000.

Bids Asked June 27

Pa., Chester—K. F. Otto, archt., 6910 Market St., Upper Darby, 24 semi-detached residences and 10 semi-detached duplexes, for Home City Constr. Co., 525 E. Edgemont St. $250,000. FHA.

CONTRACTS AWARDED

★**Conn., Springdale** — Mayflower Gardens, 1740 Summer St., N. Kelley, Stamford, residential development, fifty 4, 5, 6 room frame homes. Owner builds, J. Warner, supt. Construction, 38 Lincoln Ave., Old Greenwich, **$500,000.** D. Swan, Greenwich, archt.

Mass., Adams—J. Kelly, Country Club Ave., frame, brick residential development, Gilead St. and West Rd. Owner builds, **$160,000.** CD 6/20.

Mass., Adams—J. Simon, 18 Maple St., frame residential development, Maple St. and Country Club Ave. Owner builds. Over **$150,000.** CD 6/20.

★**Pa., Glenside**—County Home Improvement Co., 225 S. 15 St., 180 single homes, to City National Constr. Co., 225 S. 15 St., Phila., **$1,080,000.** Awarded 6/15.

Pa., Phila.—Methodist Episcopal Hospital, Broad and Wolf Sts., hospital alterations, to A. Raymond Raff Co., 1635 W. Thompson St. **$150,000.** CD 2/6—ENR 2/8.

INDUSTRIAL BUILDINGS

BIDS ASKED

Bids Asked July 2

Md., Catonsville — SERVICE — Catonsville Motors, c/o Van Renselaer P. Saxe, engr. and archt., 100 W. Monument St., Baltimore, 1 story, part bsmnt., part mezzanine service bldg. and show rooms, $90,000.

Bids Asked July 3

Md., Baltimore—REPAIR SHOP—Guilford Realty Co., c/o Palmer & Landin, 1020 St. Paul St., 1 story, 120x174 ft., truck repair shop, brick, steel, concrete fdns. $75,000.

Bids Asked July 6

Calif., San Francisco—PLANT—Henry J. Kaiser Co., Latham Sq. Bldg., Oakland, replacing wood conveyor structure at ready-mix concrete plant, with steel conveyor structure and reinstall equip.

Pa., Bethayres—PLANT—G. E. Fredericks, Philmont and Anne Rd., mfg. bldg. addn. $40,000. C. Fries, 3701 N. Broad St., Phila., archt.

Bids Asked About July 21

Pa., Marcus Hook—PLANT—Sun Oil Co., 1608 Walnut St., Phila., (selected list bidders), personnel and medical bldg. $100,000-$150,000.

Bids Asked

Conn., Hartford—WAREHOUSE, etc.—Associated Transport, Inc., 325 Memorial Ave., West Springfield, brick, concrete warehouse, office bldg. and repair shop, Berlin Twp. $45,000. A. J. Carson, 325 Memorial Dr., West Springfield, archt.

Ind., Evansville—FACTORY—Servel, Inc., L. Ruthenburg, pres., Franklin St. and Kentucky Ave., two 1 story, brick, concrete, steel factory bldgs., one 94 x 270 ft., and other 100 x 100 ft. $100,000. E. C. Berendes, 121 N.W. Fourth St., archt.

Mass., Roxbury — SERVICE, etc. — Westminster Motors, Inc., 420 Warren St., automobile service and sales bldg. addns., alterations, Warren St. $45,000. A. Winebaum, 68 Devonshire St., Boston, archt. CD 3/16—ENR 4/5, under Postwar Projects.

N. J., Blue Anchor—PLANT—E. D. Scheldt, archt., Rosemont Ave., Newfield, general contract frosted food plant, for Blue Anchor Cold Storage and Frosted Food Corp., Blue Anchor. $45,000.

Pa., Greensburg — FACTORY — Sorber & Hoone, archts., 711 1st Natl. Bldg., general contract 1 story, 106x140 ft., concrete block factory, 40x40 ft. office wing and leanto for boiler and coal storage, for Pennsylvania Concrete Vault Co., Miss Margaret Macko, in charge, 44 Madison Ave.

Pa., Pottsville—WAREHOUSE—Dohn Provision Co., lessee, East Norwegian and Coal Sts., rebuilding warehouse, East Norwegian and Coal Sts., for Phila. & Reading Coal & Iron Co., Reading Terminal. $40,000. CD 6/14—ENR 6/2.

Pa., Swissvale—FACTORY—Union Switch & Signal Co., H. W. Wolff, dir. Purchases, (selected list bidders) 1 story, 80x440 ft., structural steel asbestos siding factory addn. $200,000.

Tex., Fratt (Mail Luxello) — PLANT — Haggard's Cookie & Cracker Co., Fratt, 1 story, 90x409 ft. cookie and food making plant, rein.-con., structural clay tile, $150,000. W. N. Noonan, 729 Travis Bldg., San Antonio, archt. F. T. Drought, Frost Bldg., San Antonio, engr. CD 6/4—ENR 6/7, giving Grandma Cookie Co., Fratt, as owner. CD 6/—ENR 6/7.

Ont., Hamilton—SERVICE STATION—Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, 1 story, 100x100 ft., steel frame, concrete block walls service station, Main and Walnut Sts. $45,000. N. A. Armstrong, 19 Melinda St., Toronto, archt.

Ont., Tilbury—PLANT—Leland Co. Ltd., Simcoe, 2 story, 81x110 ft., tomato processing plant, frame, tile wall, rein.-con. fdn. About $40,000.

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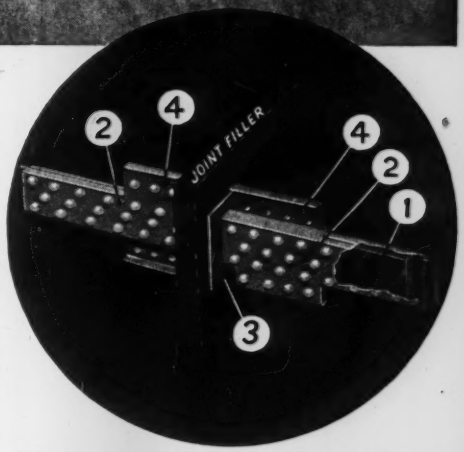

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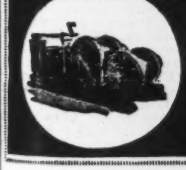

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INDUSTRIAL BUILDINGS (Cont'd.)

LOW BIDDERS

Md., Baltimore—GARAGE, etc.—Cloverland Farms Dairy, 1920 Windsor Ave., 2 story, brick, concrete garage and service bldg., from Morrow Brothers, 2315 N. Charles St. Est. **$70,000.** Kubitz & Konig, Emerson Tower Bldg., engrs.-archts.

Wash., Seattle—WAREHOUSE—Naramore, Bain, Brady & Johanson, archts., Smith Tower, 2 Ave. and Yesler Way, Zone, 4, June 15, 140x460 ft., structural steel, steel distr. warehouse, 2648 E. Marginal Way, for A. M. Castle & Co., 2600 W. Spokane St., Zone 6, from W. G. Clark Co., 408 Aurora Ave. Est. **$180,000.** CD 6/13—ENR 6/21.

CONTRACTS AWARDED

Colo., Denver — FREIGHT TERMINAL — Inter-Mountain Terminal, Pacific Intermountain Express, 10 and Galapaga Sts., 1 story, 75x306 ft., brick, concrete freight terminal, incl. dock, 48x60 ft. shop bldg., to Dutton, Kendall & Hunt, 4515 Garfield St. Est. **$160,000.** G. D. White, 615 Columbine St., archt. CD 5/16—ENR 5/24.

Colo., Denver—PLANT BLDGS.—Swift & Co., Stockyards Station, reconstructing cafeteria bldg., sausage bldg. and coolor and storage rooms, to H. W. Hammond, 1475 W. Colfax Ave. Est. **$100,000.**

Conn., Middletown—LABORATORY—Russell Mfg. Co., East Main St., 1 story, 65x125 ft., brick, steel laboratory, East Main St., to Dennis O'Brien & Sons, Inc., 190 Trumbull St., Hartford. Est. **$42,000.** CD 3/2/44—ENR 3/24/44, under Postwar Projects.

Conn., Meosup—PLANT—V. A. Laakso, Plainfield, and H. Memmott, Brooklyn, brick, steel, concrete quick freezing plant, individual lockers for frozen food, S. Main St. Owners build. **$40,000.**

Ill., Woodstock—FACTORY—Alemite Die Cast & Mfg. Co., 538 Erie St., Toledo, O., 2 story, brick, concrete, steel factory addns., to O. E. Strom, 102 Main St., Crystal Lake, **$100,000.** CD 524—ENR 5/31.

Kan., Manhattan—FACTORY—Manhattan Viking Co., W. W. Rofsees, pres., Manhattan, factory, to Mont J. Green, 113A N. 3 St., approx. **$75,000.**

Mass., Westboro—FACTORY—Corrugated Paper Co., c/o M. E. Dodds, Clinton, 1 story, 90x270 ft., concrete, brick, timber factory and mercantile bldg. Owner builds. Est. **$40,000.** R. Garland, 340 Main St., Worcester, archt.

★ **Minn., International Falls** — PLANT — Minnesota & Ontario Paper Co., J. H. Davidson, ch. engr., 500 Baker Arcade, Minneapolis, general contract filtration plant for paper mill, to P. A. Lawrence Co., 852 Builders Exchange bldg., Minneapolis; precipitator and filter, to Permutit Co., 307 Essex Bldg., Minneapolis. Est. **$650,000.** CD 2/3/44—ENR 2/24/44 under Postwar Projects.

★ **Mo., St. Louis**—FACTORY—Hussmann-Ligonier Co., W. B. McMillan, pres., 2401 N. Leffingwell Ave., Zone 6, two 1 story, steel, brick factory bldgs., Glasgow Ave. and Benton St., to Fruin-Colnon Contg. Co., 502 Merchants Maclede Bldg., Zone 1, approx. **$500,000.** CD 5/14—ENR 5/31, under Postwar Projects.

Mo., St. Louis—FACTORY—Mario Coil Co., 6135 Manchester Ave., Zone 10, 1 story, 60 x 240 ft., brick, concrete factory addn., warehouse and shipping room, to H. LaBoube, 7404 Devonshire Ave., Shrewsbury, St. Louis, Zone 17. Est. over **$40,000** with equip. Brussell & Viterbo, 1630 Arcade Bldg., 806 Olive St., Zone 1, engrs.

★ **O., Dayton**—FACTORY—Delco Products Co., Div. General Motors, First St., 6 story, bsmnt., 172x184 ft., brick, steel, concrete and glass block factory addn., First St. between Foundry and Sears Sts., to James I. Barnes Constr. Co., Talbott Realty Bldg., approx. **$810,000.** Argonaut Realty Co., General Motors Research Bldg., Detroit, Mich., engr. CD 5/1—ENR 5/3.

O., Dayton—FACTORY—National Cash Register Co., 1400 S. Main St., brick, steel, concrete factory addn., to Industrial Building Co., Reibold Bldg. Est. **$41,000.**

O., Toledo—PLANT—Airite Mfg. Co., 730 Phillips Ave., dairy equip. mfg. plant, 5500 Telegraph Rd., to A. Bentley & Sons Co., 201 Belmont St. Est. **$40,000** or more with equip. Awarded 6/13. Hahn & Hayes, 723 Adams St., archts.

O., Toledo — LABORATORY — Packard Motor Co., 1330 Laskey Rd., laboratory bldg., to J. H. Berkebile & Sons, 998 Whittier St., **$111,000.** Albert Kahn Associated Architects & Engineers, Inc., 345 New Center Bldg., Detroit, Mich., archts.

O., Toledo—PLANT—Schill Pattern Co., 2100 Hendon St., 1 story, concrete, steel, brick pattern shop, Phillips Ave., to John Picoh Co., 1130 Prospect St. Est. **$40,000** with equip. Awarded 6/14. CD 4/13—ENR 4/26.

Pa., Emporium—FACTORY, etc.—Cameron Mfg. Co., B. Carsons, Mgr., 2 story, 50x60 ft., brick factory side addn., alterations, to B. C. Skinner & Son, 209 E. Washington Ave., DuBois. Est. **$50,000.**

Pa., Ivy Rock (P. O. Conshohocken)—PLANT—Alan Wood Steel Co., Ivy Rock, alterations, installing machinery gillet preperation plant, to Arthur G. McKee & Co., 2300 Chester St., Cleveland, O. **$120,000.**

Pa., North East—PRESS—Keystone Co-Operative Grape Assoc., 63 Wall St., 2 story, bsmnt., 40x100 ft., concrete block press bldg., own forces. **$50,000.**

Pa., Phila.—PLANT—Allas Metal Stamping Co., Inc., Kensington and Castor Aves., mfg. plant addns., alterations, to J. J. Clearkin, 4450 Leiper St., **$310,575.** Awarded 6/14. G. H. Murphy, 4413 Frankford Ave., archt.

Pa., Phila.—SUBSTATION—N. Shellenberg & Co., 12 and Market Sts., substation and low tension electrical distr. sys. to Utilities Engineering Co., 33 and Arch Sts., **$175,000.** Awarded 6/21. J. S. Simsohn, 933 N. Broad St., engr.

Pa., Pittsburgh — LABORATORY, etc.—Heppenstall Co., S. B. Heppenstall, vice pres. in charge, 4620 Hatfield St., laboratory alteration, addn., to Pittsburgh Industrial Engrg. Co., 3939 Butler St. Est. **$170,000** incl. equip.

Pa., St. Marys—PLANT—Sylvania Electric Products, Inc., W. Zimmer, genl. mgr., Emporium, 1 story, bsmnt., 30x80 ft., radio tube plant addn., hollow tile, structural steel, concrete fdn., to Moyer Bros., 26 and Beale Sts., Altoona. Est. **$40,000.** C. Wagner, 133 W. 4 St., Williamsport, archt.

Tex., Brownsville—PLANT—Brownsville Ice Co., Brownsville, ice plant unit. Owner builds. **$40,000.** CD 5/2—ENR 5/10.

Tex., Dallas—INSPECTION—Dallas Railway & Terminal Co., Elm and Peak Sts., 145x103 ft., brick, hollow tile, rein.-con. steel bus inspection shop, to R. E. McKee, Box 2848, Dallas, **$78,480.** CD 5/24—ENR 5/31.

Tex., Fratt (mail Luxello)—PLANT—Hagard's Cookie & Cracker Co., c/o R. E. Hagard, owner, rebuilding 90 x 409 ft. plant, etc., to J. L. Harwell, 2618 E. Houston St., San Antonio. Est. **$150,000.** CD 6/20—ENR 6/28.

Tex., Hempstead—Brazos Valley Refrigeration, Inc., Bellville, 2 locker plants, Waller Co., to E. E. Rapsilver, Hempstead, Strauss-Frank Co., 1618 Fannin St., Houston, and B & B Engrg. & Supply Co., Inc., 2900 Washington St., Houston, **$66,000.**

Wis., Greenfield (P. O. Milwaukee)—WAREHOUSE, etc.—Forty Third Street Corp., 2400 S. 43 St., Zone 7, 2 story, part bsmnt., 76x171 ft. warehouse garage, to Bauer Const. Co., 3851 N. 100 St., Wauwatosa, Zone 13. Awarded 6/13. CD 5/8—ENR 5/10

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INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Wis., New Richmond—MILL—Doughboy Industries, Inc., E. J. Cashman, pres., New Richmond, general contract feed mill, rein.-con., machinery, conveyor sys., to H. N. Leighton Co., 716 S. 7 St., Minneapolis, Minn., **$300,000**. Magney, Tusler & Setter, 202 Foshay Tower, Minneapolis, Minn., archts.

★ **Wis., Port Washington**—POWER PLANT—Wisconsin Elec. Power Co., 231 W. Michigan St., Milwaukee, Zone 3, electric power plant addn., separate contracts, **$7,-119,500** incl. equip.; structural steel for above, to Milwaukee Bridge Co., 3282 W. 34 St., Milwaukee, Zone 10; excav. and grading, to A. Marchese Co., 1737 N. 30 St., Milwaukee, Zone 8, awarded 6/1. CD 2/13—ENR 2/15.

Ont., London—FACTORY—Kelvinator of Canada, C. W. Hadden, genl. mgr., Dundas St. E., 1 story, 35 x 286 ft., brick factory addn., to Hyatt Bros. Constr. Co., 288 Egerton St. Est. **$60,000**. CD 6/4.

UNCLASSIFIED

PROPOSED WORK

†**Calif., Red Bluff**—TUNNEL WORK— U.S. Eng., 1209 8 St., Sacramento, Zone 8, rejected bids Mar. 28, shaft and tunnel work at Iron Canyon dam site near here, Spec. 1069. CD 4/2—ENR 4/5, under LB.

Que., Three Rivers—GAS MAINS—City Gas & Electric Corp., Ltd., Three Rivers, gas mains in streets not yet paved, supply domestic services to 500 dwellings. $100,000.

BIDS ASKED

Bids Asked After July 1

★ †**La., Opelousas**—AIRPORT—Civil Aeronautics Admin., P. O. Box 1689, Fort Worth 1, Tex., airport incl. excav., drainage, paving, etc. $300,000. CD 6/14—ENR 6/21.

Bids Asked July 2

N. J., East Orange—MEMORIAL FIELD GRADING, etc.—Bd. Recreation, City Hall, grading, seeding, planting, etc., at Memorial Field. Bids 6/6 rejected. CD 5/31.

Bids Asked July 6

Missouri—RURAL ELECTRIC LINES—Cuivre River Electric Cooperative, Inc., Troy, constructing, completing 225 to 250 mi. rural electric lines, Lincoln Co. $225,000. Tentative date. Michael Drazen & Associates, 4903 Delmar Blvd., St. Louis, Zone 8, archts. CD 11/16—ENR 11/30, under Postwar Projects.

†**Pa., Wilkes-Barre-Scranton**—AIRPORT—Civil Aeronautics Admin., 385 Madison Ave., New York 17, N. Y., clearing, grading, drainage at airport, Prop. 1-45-584. Plans deposit $10.

Bids Asked July 19

Tex., San Antonio—SWIMMING POOLS—City, G. B. Mauermann, mayor, swimming pools and bathhouses, pumphouses, deep well pumps, etc., purification sys., etc. 1 on north side of Brackenridge Park and other on south side on Drexel Ave., near Eagle Field. Plans deposit $25. M. L. Diver, City Hall, engr. CD 2/27—ENR 3/1.

LOW BIDDERS

†**Colo., Pueblo**—PADS AND BARRICADES, etc.—U. S. Eng., 909 17 St., Denver, June 23, pads and barricades and access reads, Pueblo Ordnance Depot, from Peter Kiewit Sons Co., Box 4149, So. Denver Station, Denver, **$581,362**.

†**S.D., Provo**—STORAGE PADS, etc—U. S. Eng., 909 17 St., Denver, Colo., June 23, 56 covered storage pads and 104,700 lin. access roads, involving 120,000 tons gravel surfacing, etc., at Black Hills Ordnance Depot, from Peter Kiewit Sons Co., Omaha Natl. Bank Bldg., Omaha, Neb., **$244,715**.

CONTRACTS AWARDED

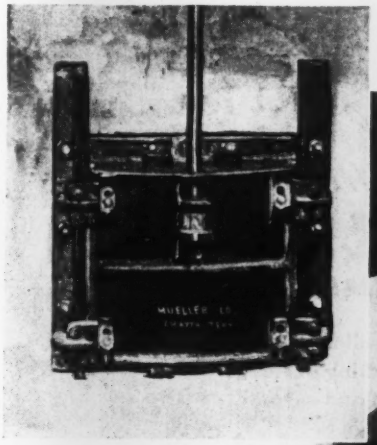
†**Ark., Camp Joseph T. Robinson**—TRAINING AIDS, etc.—U. S Eng., 300 Bway, Little Rock, training aids, etc., Contr. W-03-050-eng-274, to Ditmars-Dickmann-Pickens Constr. Co., Little Rock, **$25,000**.

†**Calif., Alameda**—OPEN STORAGE AREA—U. S. Eng., 74 New Montgomery St., San Francisco, addnl. construction, open storage area, Auxiliary Air Station, Intransit Depot, Spec. 2134-4, to N. M. Ball Sons, Box 430, Berkeley, **$172,945**.

†**Calif., Fort Mason**—SPRINKLER PROTECTION—U. S. Eng., 74 New Montgomery St., San Francisco, sprinkler protection, Fort Mason, Spec. 2097, to Herman Lawson Co., 465 Tehama St., San Francisco, **$156,340**.

†**Calif., Lathrop**—SPRINKLER SYSTEM—U. S. Eng., 1209 8 St., Sacramento, Zone 8, sprinkler sys. in warehouses, Spec. 1125, to Beeson Bros. Engineering Co., 1400 N. Spring St., Los Angeles, **$198,875**.

★ **Calif., Long Beach**—WHARF, etc.—City Harbor Dpt., 1333 El Embarcadero, concrete wharf deck, railroad track, storm drain and transit shed foundations at Berths 4, 5, 6 & 7, Outer Harbor, Spec. HD-197, Sect. C, to E. B. Bishop, Orland, **$677,155***** Sect. A, to Sully-Miller Contg. Co., 1500 W 7 St., **$211,713***Sect B, to Sharp & Fellows & Wm. Smith, 108 W. 6 St., Los Angeles, **$136,627**. Grand total $1,025,495. CD 6/13—ENR 6/21.



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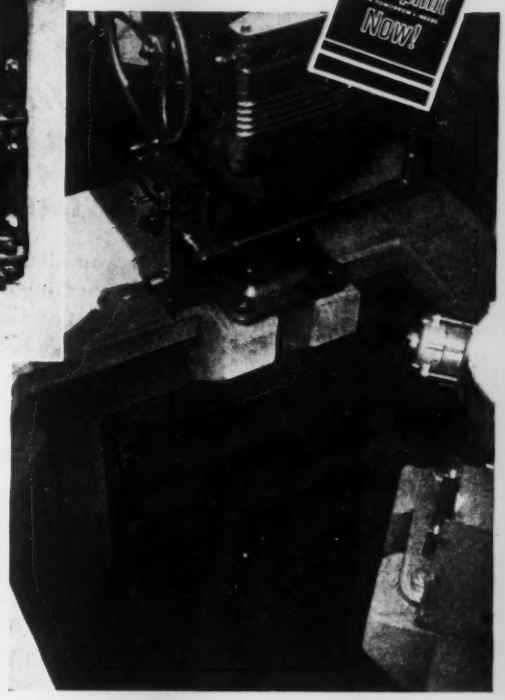

LONG RANGE ECONOMY

When you consider sluice gates and other allied equipment, remember that "only the BEST is good enough". A sluice gate is often submerged in water or sewage for years. It may be opened but a few times in months. Or on the other hand it often is used daily. It must operate readily. It must be water-tight when closed. There dare not be any failures. Long range economy demands that you get sluice gates that are built to last for generations without replacement or annoying maintenance troubles.

A MUELLER-COLUMBIAN Sluice Gate meets all these tests. See the husky little two-footer shown at the top. It is just as accurately cast, machined, and assembled as is its big ninety-six inch brother shown in the lower illustration. Each will perform faithfully for years to come. These two views taken in the Dallas Disposal Plant are mute testimony to the far-sightedness of the engineers who designed the plant—men who, believing that "only the BEST is good enough", chose MUELLER-COLUMBIAN equipment in preference to any other made. For complete details of the MUELLER-COLUMBIAN Line write for Catalog A-300.

★

MUELLER CO., CHATTANOOGA, TENN.
DECATUR, ILL. LOS ANGELES, CALIF.

Summertime IS CHECK-UP TIME

Here's why Reznor suggests you allot some time of your busy day to checking over Reznor installations in the plants and stores of your town. These tune-ups give you an opportunity to talk heating to your customers. You can show them what they need and book orders on the spot for delivery when equipment is available. . . . That's the immediate return of tune-ups. Then you have an added benefit—people will like to do business with you if you show consideration for them.

To make your tuning-up, inspection and cleaning job as easy as possible, we have drawn up this simplified check list for your use:

✔ HERE'S EASY-TO-USE CHECK LIST FOR REZNOR GAS-FIRED UNIT HEATERS

1. Check electrical connections for loose wires, insulation breaks.
2. Inspect gas connections.
3. Look over thermocouple. (If corroded, it should be cleaned with fine emery cloth. Otherwise, a simple brushing is all that is necessary. When reinstalling, make certain that thermocouple lead clamping nut on top of Baso safety pilot valve is pulled up snugly.)
4. Remove bottom pan and clean.
5. Remove and clean pilot. Inspect burners. If cleaning is necessary, suggest blowing out burners through ports with air hose.
6. Look at inside of tubes. If dirty, they should be wiped clean inside and out.
7. Motor and fan blades should be wiped free of dust, lint, and grease.
8. Reassemble and check operation.

NOTE: The average time required to check a Reznor Unit Heater is 15 minutes, except when it is necessary to clean out burner ports and the inside of the tubes. These operations require a little more time.

Special Note . . . place your Reznor Unit Heater order now for 1946 delivery. Urgent civilian and military requirements must be filled first, but our production will increase as the material situation eases.

REZNOR REZNOR MANUFACTURING CO.
105 JAMES ST. - MERCER, PENNA.

"GAS HEATERS EXCLUSIVELY SINCE 1888"

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Calif., Long Beach—PLANE ANCHORAGE SURFACING—U. S. Eng., 351 S. Figueroa St., Los Angeles, Zone 55, surfacing plant anchorage area at Long Beach Army Airfield, No. 330, to Pacific Rock & Gravel Co., and W. M. Stanfield Co., 208 W. 8 St., Los Angeles, approx. **$120,000.**

†Calif., Merced—HANGARS—U. S. Eng., 1209 8 St., Sacramento, Zone 8, altering steel hangars, erecting steel hangars, at Merced Army Air Field, Spec. 1133, to Trewhitt, Shields & Fisher, Pacific Southwest Bldg., Fresco, **$100,720.** CD 5/21—ENR 5/24.

★ **†Calif., Port Chicago** — CARHOLDING FACILITIES, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash. 25, D. C., addnl. carholding facilities and related operating facilities, Inland Storage Area, Naval Magazines, Spec. 16229, NOY 12046, to Frederickson & Watson Constr. Co., 873 81st Ave., Oakland. Est. **$3,000,000.** CD 6/14, under LB.

Calif., San Fernando—AIRPORT—M. E. Whiteman, 12,930 Pierce St., airport, incl. runways, drainage, two 100x112 ft. hangars at site adjacent to Roger Jessup Park, to T. M. Page, 1556 Pueblo Dr., Glendale, approx. **$300,000.**

★ **†Fla., Eglin Field (br. Crestview)**—RUNWAYS, etc.—U. S Eng., Grant St. west of Westwood St, Mobile 7, Ala., addnl runways, taxiways and apron, access roads and drainage, Contr. W-01-076-eng-1079, to Noonan Constr. Co., 1001 E Gregory St., and Smith Engineering and Constr. Co. W. Pensacola St, Pensacola, **$3,468,252.** CD 6/5—ENR 6/7, under LB.

†Ga., Rome—SWIMMING POOL—U. S. Eng., Post Office Bldg., Savannah, 50x100 ft. swimming pool and filter plant at Battey General Hospital, to Christian & Bell Co., 101 Marietta St., N.W., Atlanta, $67,132.

Missouri—RURAL ELECTRIC LINES—Genevieve Electric Cooperative, Inc., Theo. A. Carron, pres., Ste. Genevieve, 162.3 mi. rural electric distr. lines in 2 separate sys. with transformer station for each sys., in Perry and Ste. Genevieve Counties, to K. H. Drew Co., 528 Architects & Builders Bldg., Indianapolis, Ind., approx. **$172,000.** Bids 1/18. CD 1/8—ENR 1/11.

†Neb, Sidney—STORAGE PAD COVERS—U. S. Eng., 909 17 St., Denver, Colo., erecting storage pad covers, Sioux Ordnance Depot, Contr. W-05-016-eng-342, to Olson Constr. Co., 410 S. 7 St., Lincoln, **$83,000.**

★ **†Nev., Hawthorne**—BARRICADES, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., barricades and dugouts for Transfer Depot expan., imprv. program, N. A. D., NOY 11781, to Wm. P. Neil Co., Ltd., P. O. Box EE, Hawthorne, **$707,717.** CD 6/15, under LB.

†Ohio — SPRINKLER PROTECTION — U. S. Eng., 522 U. S. Post Office and Courthouse Bldg., Cincinnati, Zone 1, automatic sprinkler protection Patterson Field, Fairfield and Area A, Wright Field, Dayton Contr. W-33-015-eng-950, to Automatic Sprinkler Corp. of America, Brittain St., Youngstown, est. **$147,588.**

†O., Cleveland—RECREATIONAL FACILITIES—U. S. Eng., 925 New Federal Bldg., Pittsburgh 19, Pa., outdoor recreational facilities Crile General Hospital, near here, Contr. W-36-058-eng-1363, to Loesch & Green Constr. Co., 4100 Brookpark St., **$25,895.** Bids 5/21.

†O., Dayton — SPRINKLER SYSTEM — U. S. Eng., 522 U. S. Post Office and Courthouse Bldg., Cincinnati, Zone 1, installing sprinkler sys., at Patterson Field, to Automatic Sprinkler Corp., 510 Main St., Cincinnati, **$156,690.**

Oklahoma—POWER LINES—Rural Elec. Coop., Inc., Box 68, Lindsay, 39.7 mi. electric power lines to serve 64 members, Garvin Co., to G. M. McLaughlin Co. 411 NE 38 St., Oklahoma City, **$33,719.** C. H. Guernsey & Co., Petroleum Bldg., Oklahoma City, engrs. CD 11/16—ENR 11/30, under Postwar Projects.

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Ore., Clatskanie—INSPECTION PIT, etc.—U. S. Eng., Pittock Block, Portland, inspection pit, road, etc., Beaver Ammunition Terminal, near here, Contr. W-35-026-eng-1462, to C. T. Malcolm, 3523 N.E. Davis St., Portland, est. **$49,499.**

†Okla., McAlester—BARRICADES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., barricades at transfer depot and repairs and corrective work, Naval Ammunition Depot, NOY 11570, to Ransdell Constr. Co., 1014 Liberty Bank Bldg., Dallas 1, Tex., **$274,969.**

Okla., Oklahoma City—HANGAR—E. Simon, city clk., City Hall, frame bldg. for hangar, on Bethany Airport, to Star Mfg. Co., 3012 S. Stiles Ave., **$27,460** exclusive of plumbing, electric work, etc. Est. $30,000. Bids 6/1. CD 4/24.

†Pa., Butler—UNDERGROUND STEAM SUPPLY, etc.—**U. S. Eng., Standard Oil Bldg.**, Baltimore 2, Md., underground steam supply and return mains, Deshon General Hospital. Contr. W-18-020-eng-850, to H. B. Dissinger, 1020 S. 30 St., Harrisburg, **$25,140.**

†Pa., New Cumberland — SPRINKLER SYSTEMS—U. S. Eng., Standard Oil Bldg., Baltimore 2, Md., automatic sprinkler sys., New Cumberland ASF depot, Contr. W-18-020-eng-852, to Globe Automatic Sprinkler Co., 2035 Washington Ave., Phila., est. **$202,675.**

Pa., Phila.—PARKING LOT SHELTER, etc.—Scott Powell Dairies, 45 and Parrish Sts., parking lot shelter and platform, to E. Clifford Durell & Son, Inc., 3701 N. Broad St., **$112,000.** Awarded 6/15.

Rhode Island and Massachusetts—POWER TRANSMISSION LINE—Narragansett Electric Co., Melrose St., Providence, R. I., 110,000 volt power transmission line from Providence, R. I. to Milbury, Mass. Owner builds. Over **$25,000.**

†R. I., Quonset Point—ELECTRIC DISTRIBUTION SYSTEM IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., to electric distr. sys., addns., modifications. Naval Air Station, NOY 11329, to Coken Co., 16 Greene St., Providence, **$32,247.**

Texas — ELECTRIC DISTRIBUTION LINES—Taylor Elec. Cooperative, Merkel, 80 mi. electric power lines, Taylor Co., to Teague & Goodman, Sherman, **$60,756.** H. N. Roberts, Lubbock, engr. CD 4/17—ENR 4/19.

Tex., Andrews—OIL PIPELINE CARRIER—Humble Pipe Line Co., Humble Bldg., Houston, several miles 4 in. crude oil pipeline carrier. Owner builds. **$25,000.** CD 5/9—ENR 5/24.

†Tex., Camp Normoyle—OPEN SHEDS—U. S. Eng., Fort Sam Houston enclosing open sheds, to Hill & Combs, 321 Melrose Pl., San Antonio, **$490 663.** Bids 6/19. CD 5/25—ENR 5/31.

†Tex., Fort Sam Houston—SWIMMING POOL—U. S. Eng., Fort Sam Houston, 42x100 ft., rein.-con., enclosed heated swimming pool, 64x181 ft., masonry bldg., Serial W-41-154-45-170, to Nathan Wohlfeld, P. O. Box 7084, Dallas, **$121,363.** Bids about 6/19. CD 6/4—ENR 6/7.

†Tex., Fort Sam Houston — WATER SPRINKLER SYSTEM—U. S. Eng., Fort Sam Houston, water sprinkler sys., etc., incl. c.i. distr. lines, Serial #W-41-154-45-176, to Reliable Aut. Sprinkler Co., 1715 N. Young St., Oklahoma City, Okla., **$162,777.** Est. $225,000. Bids 6/14. CD 6/7.

†Tex., Fort Sam Houston—BOWLING ALLEYS—U. S. Eng., Fort Sam Houston, with 150x170 ft., rein.-con. and masonry bldg. housing 28 bowling alleys, to G. N. Mitchell, 612 American Life & Hospital Bldg., San Antonio, **$136.582.** Bids 6/19. CD 5/15—ENR 5/24.

Tex., Houston—BOWLING LANES, etc.—River Oaks Corp., 1310 McDuffie St., reconstructing Pladium Bowling Lanes, 122x148 ft., brick, steel, to O. L. Allen, 1922 Wentworth St., approx. **$48,000.** A. K. Stone, 419 West Bldg., Houston, archt. F. J. Niven, 2306 Crawford St., engr. CD 1/22—ENR 2/8, under Postwar Projects.

Tex., Kilgore—GAS LINES—Gulf Oil Corp., Kilgore, addnl. gas lines in gas plant zone. Owners builds. **$45,000.**

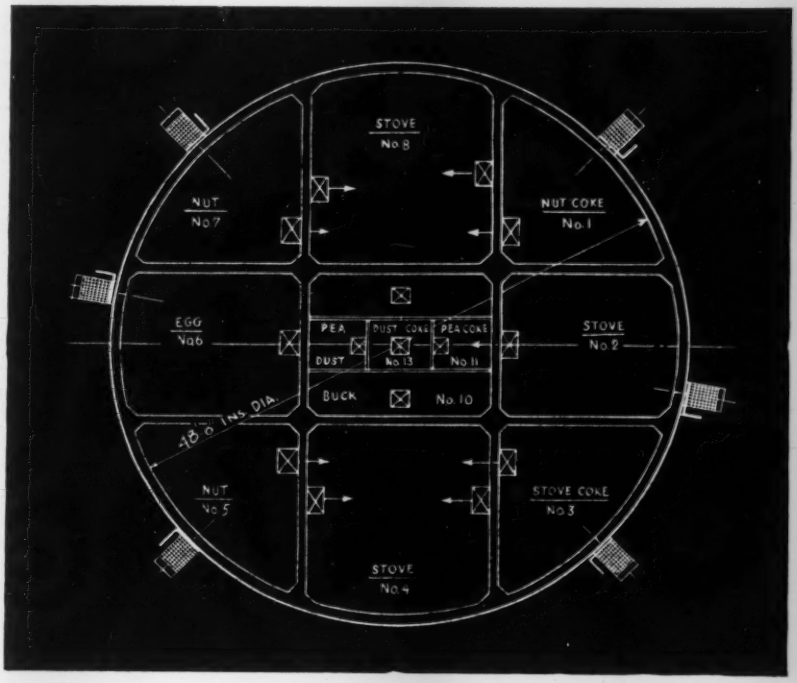
†Tex., Pyote—PARKING APRON—U. S. Eng., Albuquerque, N. M., parking apron addn., Contr. W-29-005-eng-345, Auxiliary Air Field, to Uvalde Constr. Co., 2400 Uvalde St., Dallas, est. **$108,187.**

Tex., San Antonio—STREET LIGHTING, etc.—City Pub. Serv. Bd., 217 N. St. Marys St., electric street lighting; 2 mi. 3-conductor electric power distr. line, and electric power distr. station. Owner builds. **$180,000.** CD 1/8—ENR 1/11.

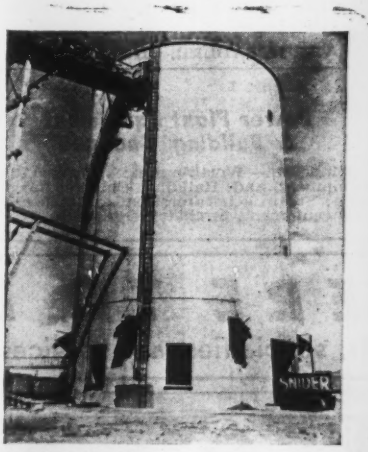
★**†Wash., Seattle** — AVIATION STOREHOUSE, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., aviation storehouse and salvage and scrap yard, Naval Air Station, Spec. 16629, NOY 11962, to Lease & Leigland, Vance Bldg., Zone 1, **$620,750.** Bids 6/6.

Proposal Advertisement see p. 172, 173 & 195

Postwar Projects see p. 118



A Lot of Storage in a Small Space



8 Large Pockets
5 Small Pockets

This is a concrete coal storage and handling pocket recently designed and constructed for Snider Fuel Company, Charlestown, Mass.

Each large pocket has one outside and one inside loading chute. Each small pocket has one chute. The weighing platform is extra long extending along the entire tunnel thus permitting the driver to load and weigh split loads without getting off the scales. Such an arrangement obviously provides the owner with large storage capacity, plant compactness and operating flexibility.

Concrete storage bins and tanks are NICHOLSON Specialties. Our engineers have concentrated on the design and construction of these important industrial units for more than thirty years. It is a subject they know thoroughly. 6-NC-1

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CONSTRUCTION BY CONTRACT

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC. · MUNSEY BLDG. WASH. D.C.

OFFICIAL PROPOSALS

Bids: July 18. (412)

Approach Substructure and Concrete Trestle

MISSISSIPPI RIVER HIGHWAY BRIDGE AT MEMPHIS, TENNESSEE—CRITTENDEN COUNTY, ARKANSAS ARKANSAS APPROACH SUBSTRUCTURE AND REINFORCED CONCRETE TRESTLE PROJECT NO. SN-A-SN-U-FAP 607-A(2), PART 2. TENNESSEE—ARKANSAS

Sealed duplicate proposals will be received by the Department of Highways and Public Works of Tennessee and the Arkansas State Highway Commission, jointly, at Room 107 Courthouse at Memphis, Tennessee, until 10:00 a.m. Central War Time on July 18, 1945, for the construction of Tennessee-Arkansas Project No. SN-A-SN-U-FAP 607-A(2), Part 2, consisting of the ten approach piers and the reinforced concrete trestle of the Arkansas approach to a highway bridge over the Mississippi River, between Memphis, Tennessee, and Crittenden County, Arkansas, and will be publicly opened and read immediately thereafter in the City Council Chamber in the Courthouse, Memphis, Tennessee.

The work to be performed under this contract will consist principally of the construction on the Arkansas bank of ten (10) pile founded concrete piers, which will support the Arkansas Approach Superstructure, and a pile founded reinforced concrete trestle 481'-1" in length, connecting with the embankment of the Harahan Bridge approach roadway, as shown on the contract plans.

Bidders will be required to file with their bids duplicate financial, equipment and experience questionnaire forms made out in detail, which forms will be furnished with bid blanks.

A bidder's bond in duplicate in the amount of $40,000.00, payable jointly to the Department of Highways and Public Works of Tennessee and the Arkansas State Highway Commission on the forms furnished with the proposal, will be accepted by the States only from a surety or sureties qualified to do business both in Tennessee and Arkansas and holding certificates of authority from the United States Treasury Department and conforming to the limitations of the last published Treasury statement on acceptable sureties.

Plans, specifications and contract documents, together with forms, questionnaires and necessary information, are open to public inspection at the offices of the Department of Highways and Public Works of Tennessee, Nashville, Tennessee, and the Arkansas State Highway Commission, Little Rock, Arkansas, and of Modjeski and Masters, Engineers, State Street Building, Harrisburg, Pennsylvania, and at Room 107, Courthouse, Memphis, Tennessee, and may be secured from Modjeski and Masters, Engineers, State Street Building, Harrisburg, Pennsylvania, upon a deposit of $20.00 per set.

A refund of $10.00 per set will be made by Modjeski and Masters upon the return in good condition to them of the copy so obtained.

The War Production Board has authorized the construction of this Project without Allotment Symbol or Preference Rating.

Before the execution of the contract the successful bidder will be required to be authorized to do business in and to be licensed in both the State of Tennessee and the State of Arkansas.

No bid may be withdrawn after having been deposited or filed.

The right is reserved to reject any or all bids and to waive all technicalities.

DEPARTMENT OF HIGHWAYS AND PUBLIC WORKS OF TENNESSEE
C. W. PHILLIPS, COMMISSIONER
ARKANSAS STATE HIGHWAY COMMISSION
WM. H. SADLER, CHAIRMAN

Bids: August 1 (413)

Power Plant Equipment & Building Changes

Minnesota—Worthington: Power Plant Equipment and Building Changes as follows: Steam generator, coal and ash handling equipment, auxiliary equipment, equipment erection, piping and accessories, insulation, station wiring and switchgear alterations, building changes and additions, equipment alterations and painting; all in accordance with plans and specifications prepared by Ralph D. Thomas and Associates, Engineers, 1200 Second Avenue South, Minneapolis 4, Minnesota. Plans and specifications are available for inspection at the offices of the Consulting Engineers, the Builders Exchange in Minneapolis, the Builders Exchange in St. Paul and the office of the City Clerk at Worthington, Minnesota. Copies of these plans and specifications may be obtained from the Engineers on deposit of the sum of Thirty-five ($35.00) Dollars. This deposit will be refunded to each unsuccessful bidder, who has submitted a complete bid, upon return of the plans and specifications in good condition within a reasonable time after receipt of bids. Additional copies of the specifications may be obtained from the Engineers upon payment of Thirty-five ($35.00) Dollars each, Twenty ($20.00) Dollars of which will be refunded upon return of specifications within 45 days from receipt of bids. Additional sheets from the specifications may be obtained for 10c each and additional blueprints of the plans may be obtained for 60c each.

ADDITIONAL PROPOSALS

(On pages 173 & 175)

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Featuring additional products, specialties, and services for the Construction Industry

IMMEDIATE DELIVERY
UNIVERSAL Level-Transit
Telescope 12" long, 25 power—Horizontal Circle 4½" with vernier to 5 minutes—Vertical Arc 3"—Clamp and Tangent Screw for Vertical and Horizontal Limb—Instrument weighs 11 pounds, tripod 9 pounds.
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Construction Trends

Earthwork and Drainage Postwar Planning Report

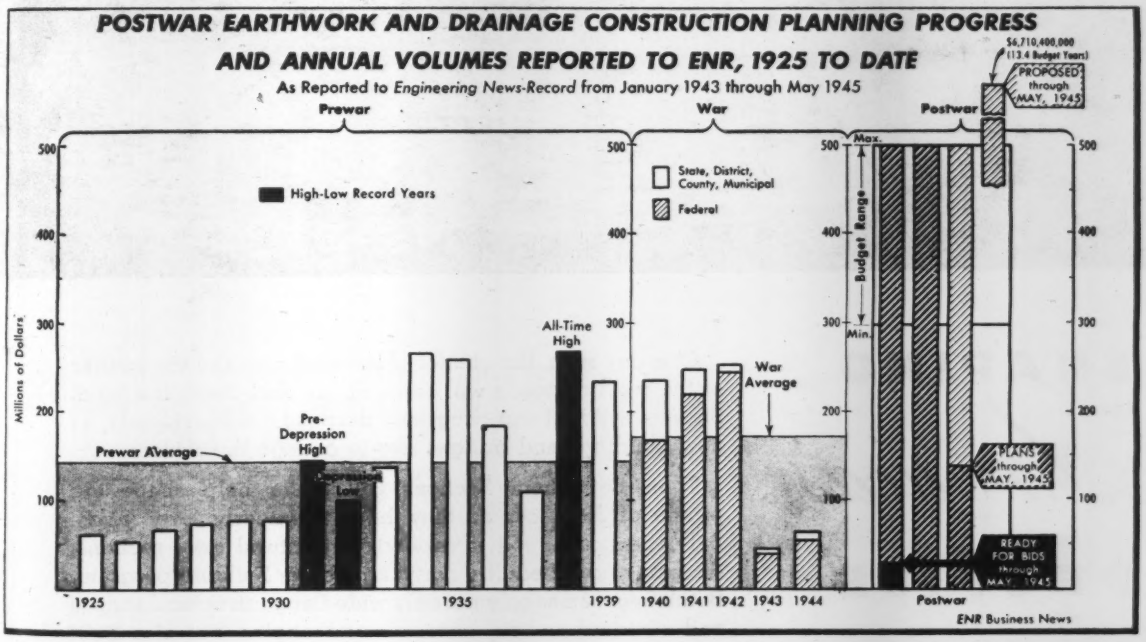
PROPOSED EARTHWORK and drainage construction volume totaling $6,710,400,000 for the 29-month period from January 1943 to June 1945 is dominated by federal projects which make up 95 percent of the total. These federal postwar projects recorded by *Engineering News-Record* at $6,391,550,000 include flood control, river and harbor improvements, irrigation, and hydro-electric facilities. Municipal projects, $264,993,000 are 4 percent of the volume proposed; and state projects, $63,857,000, are 1 percent.

Proposed earthwork and drainage volume is 32 percent of the volume on record for all types of postwar construction, $21,087,437,000, and it is equivalent to a backlog of 13.4 full years of work as measured by the *ENR* maximum postwar budget of $500,000,000 per year.

More than 77 percent of the proposed postwar earthwork and drainage volume is concentrated in the two groups of states west of the Mississippi River—39.6 percent in the Far West states, and 37.5 percent in the West of Mississippi states. The balance of the proposed total is divided as follows: New England, 2.3 percent; Middle Atlantic, 4.7 percent; South, 12.0 percent; and Middle West, 3.9 percent.

Engineering plans are under way or completed on $1,137,566,000 worth of earthwork and drainage projects, 17 percent of the proposed volume for this type of construction. Federal projects account for 77 percent of the planning stage earthwork total, municipal projects for 19 percent, and state projects for 4 percent.

Of the planning stage total, $26,828,000 worth of earthwork and drainage projects are ready for bids with all planning completed and all land, legal and financing obstacles overcome. In addition, projects valued at $167,330,000 have plans completed but are held up by lack of financing, and another $36,123,000 worth of projects are financed but engineering plans are not yet completed.



ENGINEERING NEWS-RECORD. Published every Thursday. Return postage guaranteed. Vol. 134, No. 26. Price 25c per copy. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 99-129 N. Broadway, Albany, 1, N. Y., or 330 W. 42nd Street, New York 18, N. Y. Subscriptions, United States, U. S. Possessions and Latin American Republics, $5.00 for one year, $8.00 for two years, $10.00 for three years. Canada $6.00 for one year, $10.00 for two years, $12.00 for three years. Great Britain and British Possessions 60 shillings for one year, 120 shillings for three years. All other countries, $10.00 for one year, $20.00 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter October 29, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable Address: "McGrawhill New York." Member A.B.P. Member A.B.C. Copyright 1945 by McGraw-Hill Publishing Company, Inc., James H. McGraw, Founder and Honorary Chairman; JAMES H. McGRAW, JR., President; CURTIS W. McGRAW, Senior Vice-President and Treasurer; HOWARD EHRLICH, Vice-President (for business operations); JOHN ABBINK, Vice-President (for editorial operations); JOSEPH A. GERARDI, Secretary, and J. E. BLACKBURN, JR., Director of Circulation. Publication office: 99-129 North Broadway, Albany 1, N. Y. Editorial and Executive Offices: 330 West 42nd St., New York 18. District Managers and Branch Offices: Fred G. Hudson, 520 N. Michigan Ave., Chicago 11; 738-9 Oliver Building, Pittsburgh; J. W. Otterson, 68 Post St., San Francisco, 4; Aldwych House, Aldwych, London, W. C. 2, England; Washington; J. M. Spackman, New York; A. B. Cozzens, Philadelphia; E. E. Duff, Jr., Cleveland; B. F. Horn, Detroit and Chicago; W. G. Payne, St. Louis; R. N. Phelan, Los Angeles; J. I. Ballard, Boston; Ralph Maultsby, Atlanta, Ga.

Table of Contents—See Page 49

SHAPING *America's* PROFILE

One day soon, the chatter of the rivet gun and the sputter of the welding torch will resound, up and down the land. Shovels will huff and chug, and derricks creak stridently, as new buildings and bridges rise to change the skyline.

Then Bethlehem Sections will again help shape the profile of America, as they have for nearly forty years. Bethlehem mills roll a variety of structural steel sections, on recurring schedules. For your postwar building program, Bethlehem can supply not only wide-flange structural shapes and standard beams, channels and angles, but also light beam sections, zees, car-building and shipbuilding shapes.

★ BETHLEHEM STEEL **BETHLEHEM STRUCTURAL SHAPES** ★

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Have you ever asked about Northwest advantages—advantages and design that lift Northwest out of the class of ordinary machines built with price in mind—Northwest simplicity, the "Feather-Touch" Clutch Control, the Cushion Clutch, Uniform Pressure Swing Clutches, the Dual Independent Crowd, Northwest differential steering and other features that speed up operation, cut costs and increase capacity. These advantages along with proved dependability are the reasons why year after year, one out of every three Northwests sold is a repeat order.

Let's get acquainted.

NORTHWEST ENGINEERING COMPANY
1727 Steger Building, 28 E. Jackson Boulevard
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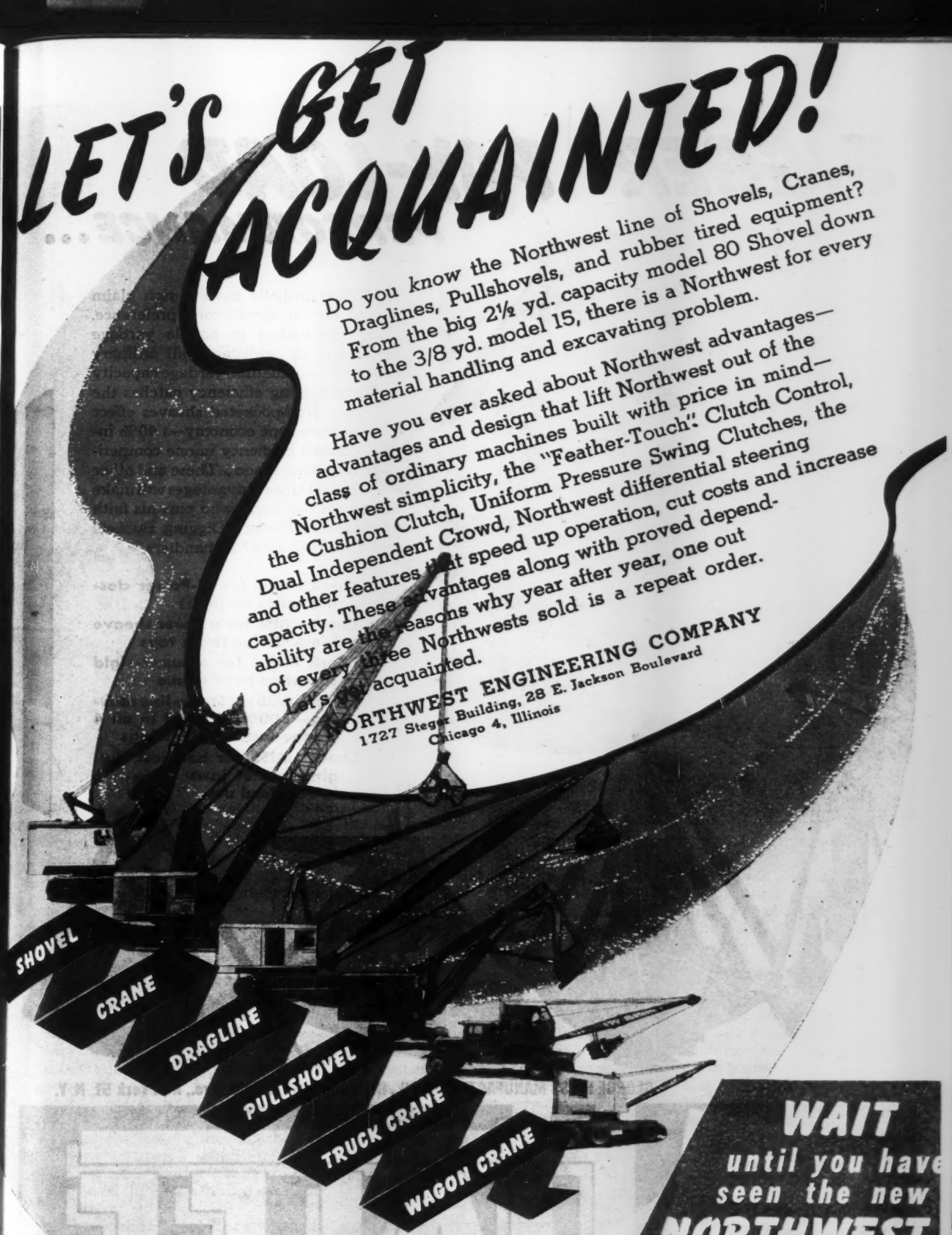

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HAISS clamshells have a rich claim staked out in contractors' preference. They are known to handle yardage faster, and to outdistance all ordinary conceptions of lifetime yardage capacity ... Their digging efficiency catches the eye. Non-pocketed sheaves effect definite rope economy—a 40% increased efficiency in one competitive comparison ... These and other Haiss Bucket advantages will make money for the many who pins his faith to these "Hi-Power" Digging Buckets and "Multi-Sheave" Rehandlers.

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Check HAISS for a super-rigid cast steel head frame

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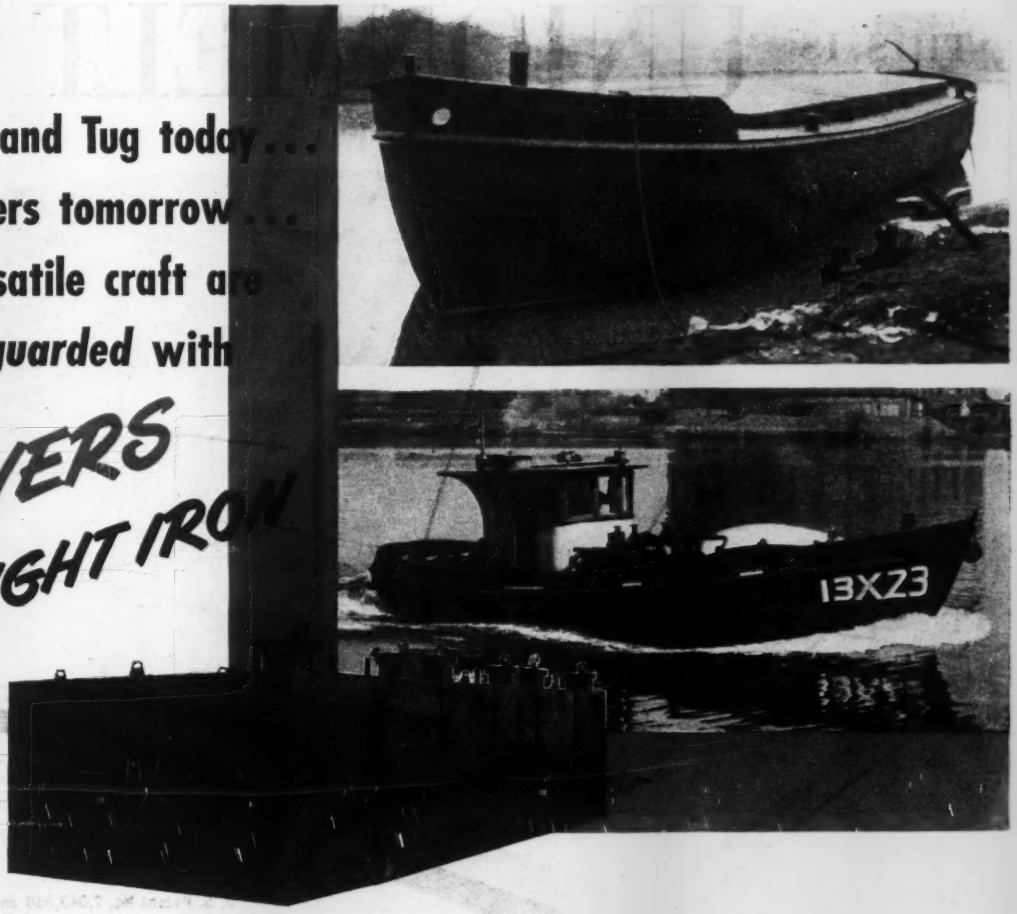
Freighter and Tug today . . .
Tankers tomorrow . . .
these versatile craft are
Safeguarded with
BYERS WROUGHT IRON



When it comes to versatility, this work boat and tug—designed by American Electric Welding Co., Inc., Baltimore, Maryland, and owned by the Haitian Agricultural Corp., S.A.—would be pretty hard to beat.

The work boat is to be used for transporting sisal part of the time and oil part of the time. The 22,000-gallon tanks illustrated are designed to fit snugly into place when oil is to be hauled. The tug can also be used as a "tanker" when necessary, as she has tank capacity of 6,000 gallons and is equipped with rotary pump for loading and unloading both herself and the tank work boat. To keep both vessels on the job, in the face of the various corrosive conditions that are present, Byers Wrought Iron was used for both hulls, and for the tanks.

The soundness of this choice is well confirmed by the old wrought iron "Diamond Head" that was tied up at Seattle and used as a floating oil tank, after 68 years at sea. At last report it had spent 8 years in this second service, and the wrought iron hull was still shipshape and watertight. And not only the sea lanes but the inland waters abound with evidences of how long and how well wrought iron hulls serve under difficult conditions. The icebreaker "F. C. Latrobe," which at last report was serving on Chesapeake Bay with its 62 year old wrought iron hull still taking punishment, the dredge "Chinook" and the snagboat "Horatio G. Wright," both with more than half a century of service behind their wrought iron hulls, are a few examples from among many.

If you are considering the construction of any work boats for salt water or fresh water service, you'll find one of the best ways of protecting the ship against corrosion, and yourself against excessive repairs and maintenance work, is to use wrought iron. The durability of wrought iron is no accident, but comes directly from the unusual structure of the material. Tiny fibers of glass-like silicate slag are threaded through a body of high-purity iron. When corrosion strikes, it is halted and diffused by these fibers, discouraging local pitting. Furthermore, the fibers help to anchor the initial protective scale, which shields the underlying metal.

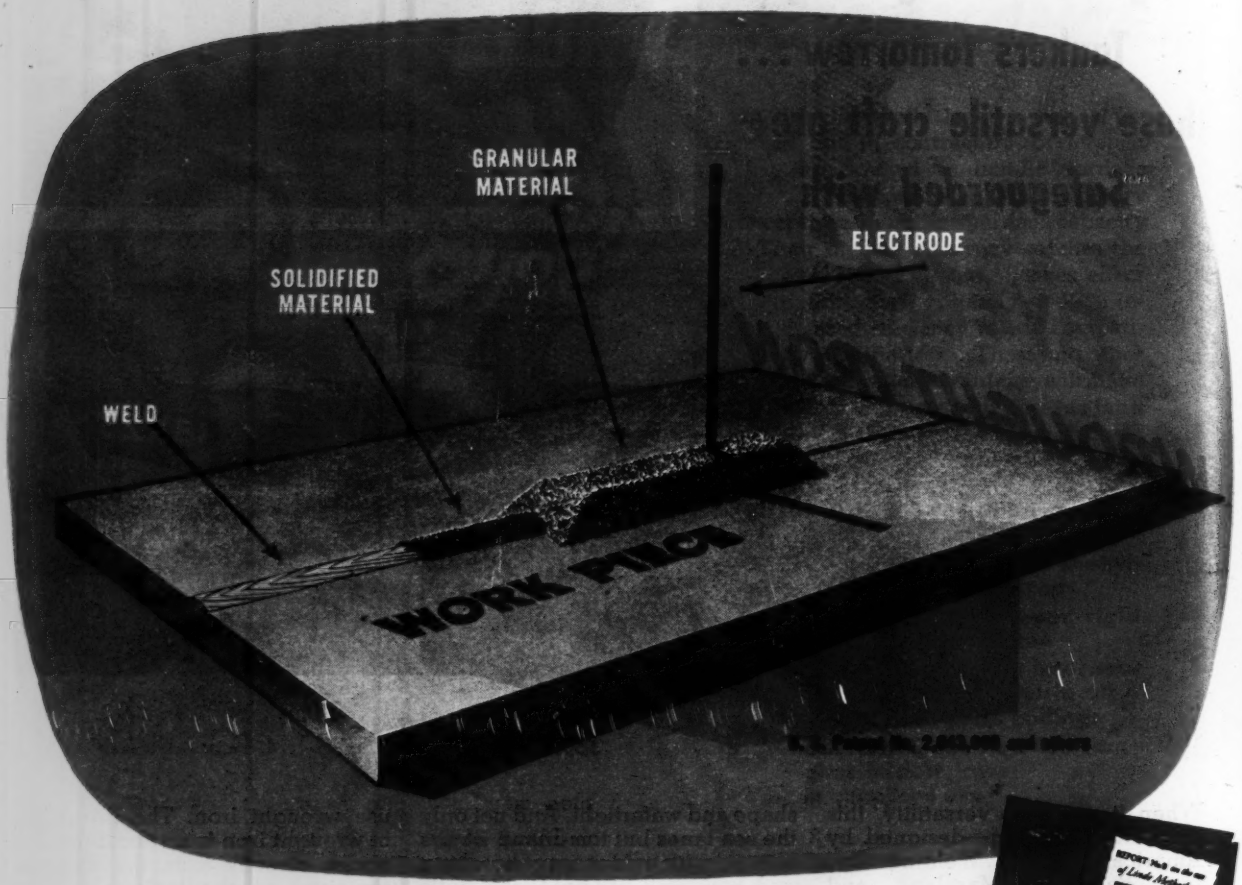
Our General Catalog will give you complete dimensional information on wrought iron, and you'll find it convenient to have in your file. May we send you a copy?

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS · OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

THIS IS UNIONMELT WELDING



UNIONMELT Welding is easy to recognize. It is electric welding done as diagrammed above—and it makes top quality welds at speeds that are greater than with any other similarly applicable process!

UNIONMELT Welding, a process of welding electrically beneath a mineral melt, has received wide application since U. S. Patent No. 2,043,960 was issued. It is the electric welding process that is rated by many as one of the most important factors in the great wartime fabrication of steel.

Anyone may obtain a license to use UNIONMELT Welding through its developers—The Linde Air Products Company.

Linde can supply a wide variety of equipment and materials to apply UNIONMELT Welding. Linde representatives can help you determine where you can use the UNIONMELT process advantageously and what type of equipment is best suited to your work.

For additional information send for the folder "Report No. 6 on the Use of Linde Methods in Mass Production."

MARITIME "M" AWARD FOR OUTSTANDING PRODUCTION ACHIEVEMENT

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 E. 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

The word "Unionmelt" is a registered trade-mark of The Linde Air Products Company.

★ BUY UNITED STATES WAR BONDS AND STAMPS ★

For any material and any haul

Euclids are your best bet!

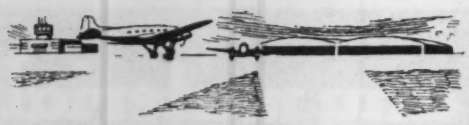
No matter what your off-the-highway hauling problem may be . . . big loads . . . steep grades . . . short or long hauls . . . Rear-Dump and Bottom-Dump EUCLIDS will move more pay dirt faster and at lower cost. Built in every part for tough hauls, Euclids combine minimum vehicle weight with maximum power and strength for large capacity off-the-highway hauling.

Fast, easy loading with modern excavating equipment . . . speed in hauling and dumping . . . rugged dependability day in and day out . . . these are reasons why leading contractors and industrial users of hauling equipment are cutting costs and increasing production with Euclids . . . reasons why Euclids are *your* best bet for any material and any haul.

Write for your copies of two new books that show Rear-Dump and Bottom-Dump EUCLIDS at work on construction jobs and mine and quarry operations.

The EUCLID ROAD MACHINERY Co. · · · Cleveland 17, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE



Pressure-Treated Piling Supports Runways on Unstable Soil

When the runways had to be extended at this Eastern airport, streams had to be diverted and the ground made stable to avoid settling under the impact of heavy planes. Pressure-treated wood piling was selected. Treated wood piling is used under hundreds of large buildings, bridges, piers and other structures. Koppers Wood Preserving Division pressure-treats piling in plants strategically located throughout the nation. Send for a copy of the booklet "Economical and Permanent Construction with Pressure-Treated Wood."

KOPPERS

and Construction

Longer Life Added to Other Advantages of Wood

The many natural advantages of wood have led to its continued use through countless centuries. It is as strong, pound for pound, as steel. It can be readily worked with simplest tools. It lends itself to prefabrication. Structures built with it can be easily expanded or altered at any time. It is economical because it has a high salvage and re-use value, and is low in first cost and maintenance. Through proper pressure-treatment, all these advantages are supplemented by permanence.

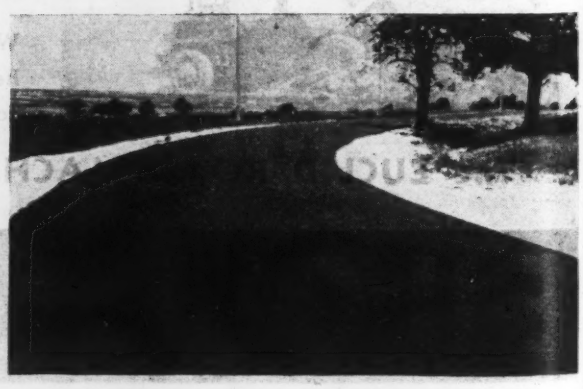
KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

KOPPERS COMPANY, INC., PITTSBURGH 19, PA.

A Properly Balanced Street and Road Program is Essential

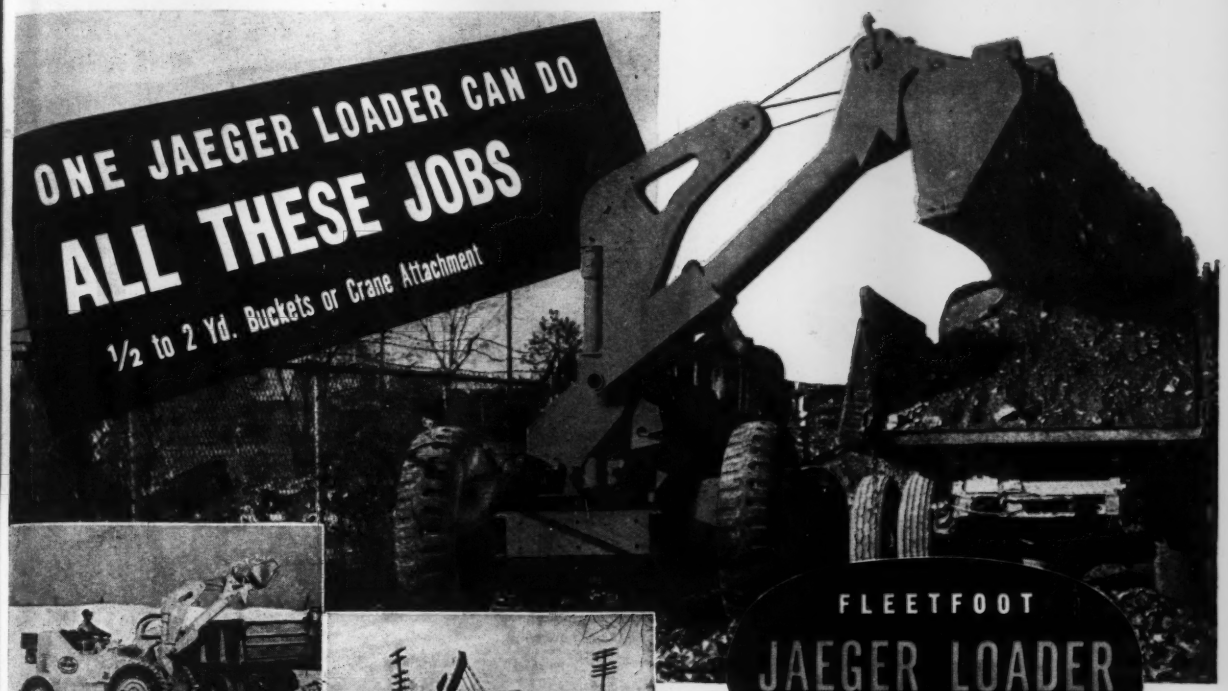
A balanced program calls for proper maintenance of existing roads and selection of the proper types of new construction. Many types of highway work can be done better with Tarmac than with any other material. Send for a copy of the booklet, "Surfacing with Tarmac."



BUY WAR BONDS . . . AND KEEP THEM

ONE JAEGER LOADER CAN DO ALL THESE JOBS

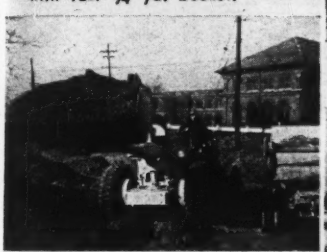
1/2 to 2 Yd. Buckets or Crane Attachment



FLEETFOOT
JAEGER LOADER
CRANE and EXCAVATOR

LOAD STONE, gravel or sand with fast ¾ yd. bucket.

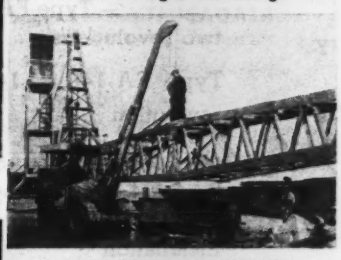
LIGHT EXCAVATION — Can dig outside its wheels.



DIG AND LOAD EARTH with ½ to 1 yd. buckets.

GRADING, BACKFILL — Ample traction for light bulldozing.

LOAD COAL, BRICKS, etc., into any size trucks—¾ or 1 yd. buckets.



12-25 FT. CRANE ATTACHMENT handles up to 6-ton loads.

REMOVE SNOW OR ASHES — 2 cu. yds. at a load.

Digs, Swings, Hoists and Dumps in One Continuous Movement

For contractors, municipalities, utilities, counties and state highway depts., the Jaeger "Fleetfoot" does the work of front-end loaders 3 TIMES FASTER, plus many additional time and labor-saving jobs. 180° swinging boom means NO MANEUVERING to load — works in tight places. TREMENDOUS CROWDING POWER with 80% of load on big front driving wheels means it can dig into any material, do prime moving, light excavating, bulldozing, clean-up work. TRAVEL SPEEDS TO 15 M.P.H. take it wherever it needs to go.

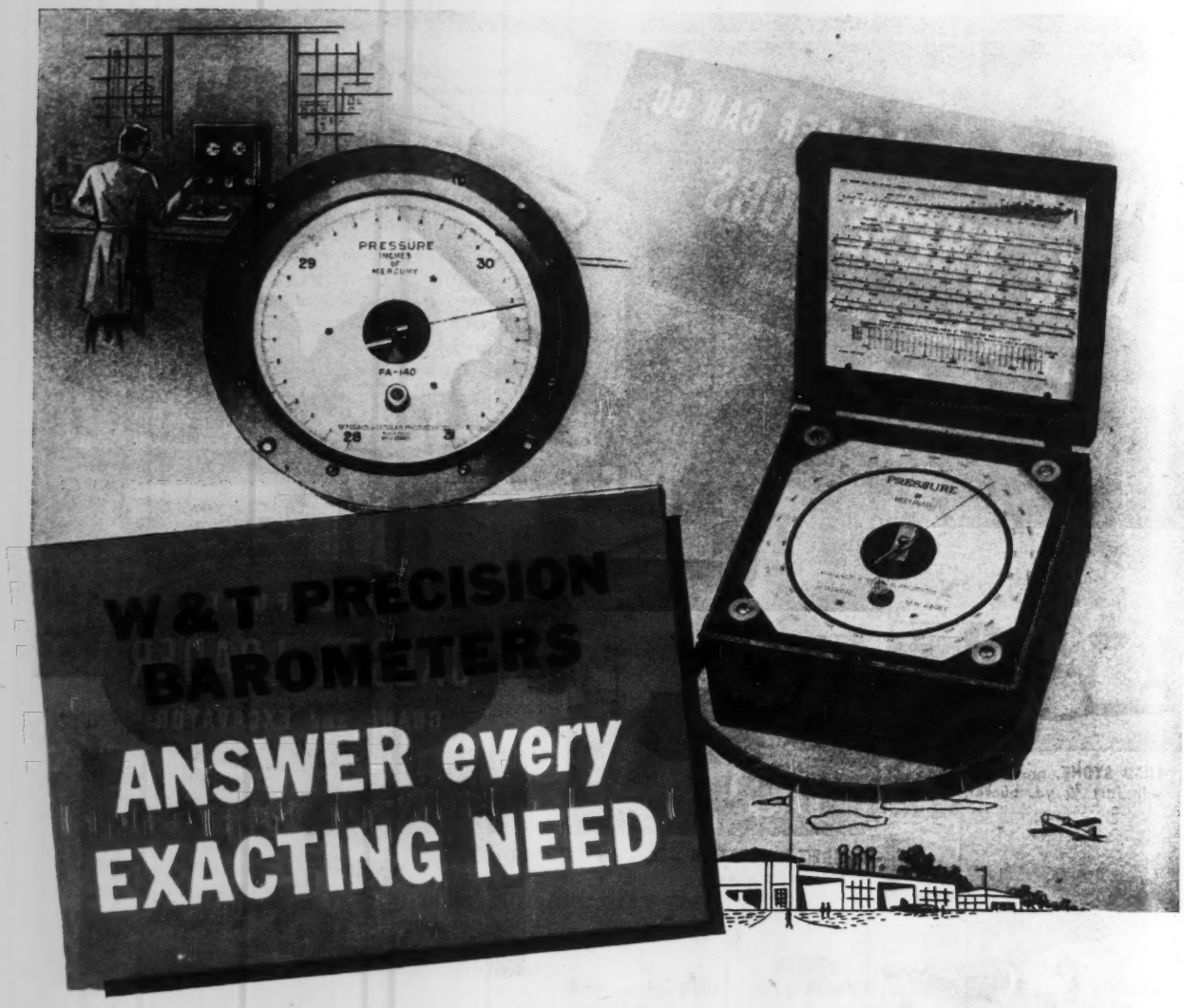
Send today for 52-page Catalog JL-5 showing a hundred year 'round uses and advantages for this mobile, fast, all-purpose Loader, Crane, Excavator.

THE JAEGER MACHINE COMPANY

Main Office and Factory — Columbus, Ohio

REGIONAL OFFICES:	8 E. 48th St. **NEW YORK 17, N.Y.**	226 N. LaSalle St. **CHICAGO 1, ILL.**	235-38 Martin Bldg. **BIRMINGHAM 1, ALA.**

Air Compressors, Mixers, Pumps, Hoists, Paving Machinery, Truck Mixers—Distributors in 120 Cities



W&T aneroid barometers are precision standards for use in meteorological service, research laboratories, and in the calibrating departments of manufacturing plants.

RANGE — Type FA-126 — 22 to 31.5 inches of mercury with 0.02 inch graduations

Type FA-140 — 28 to 31.0 inches of mercury with 0.01 inch graduations

SENSITIVITY — One part in 8,000

ACCURACY — One part in 1,000

TEMPERATURE COMPENSATION — Change in indication, less than ±0.0015 inches of mercury per 10°F change

READABILITY — Type FA-126 — 29 linear inch scale in two revolutions

Type FA-140 — 14 linear inch scale in one revolution

CONVENIENCE — Instruments are furnished in either 6 x 6 x 4 inch hardwood cases for portable use or pressure tight metal cases for laboratory installation

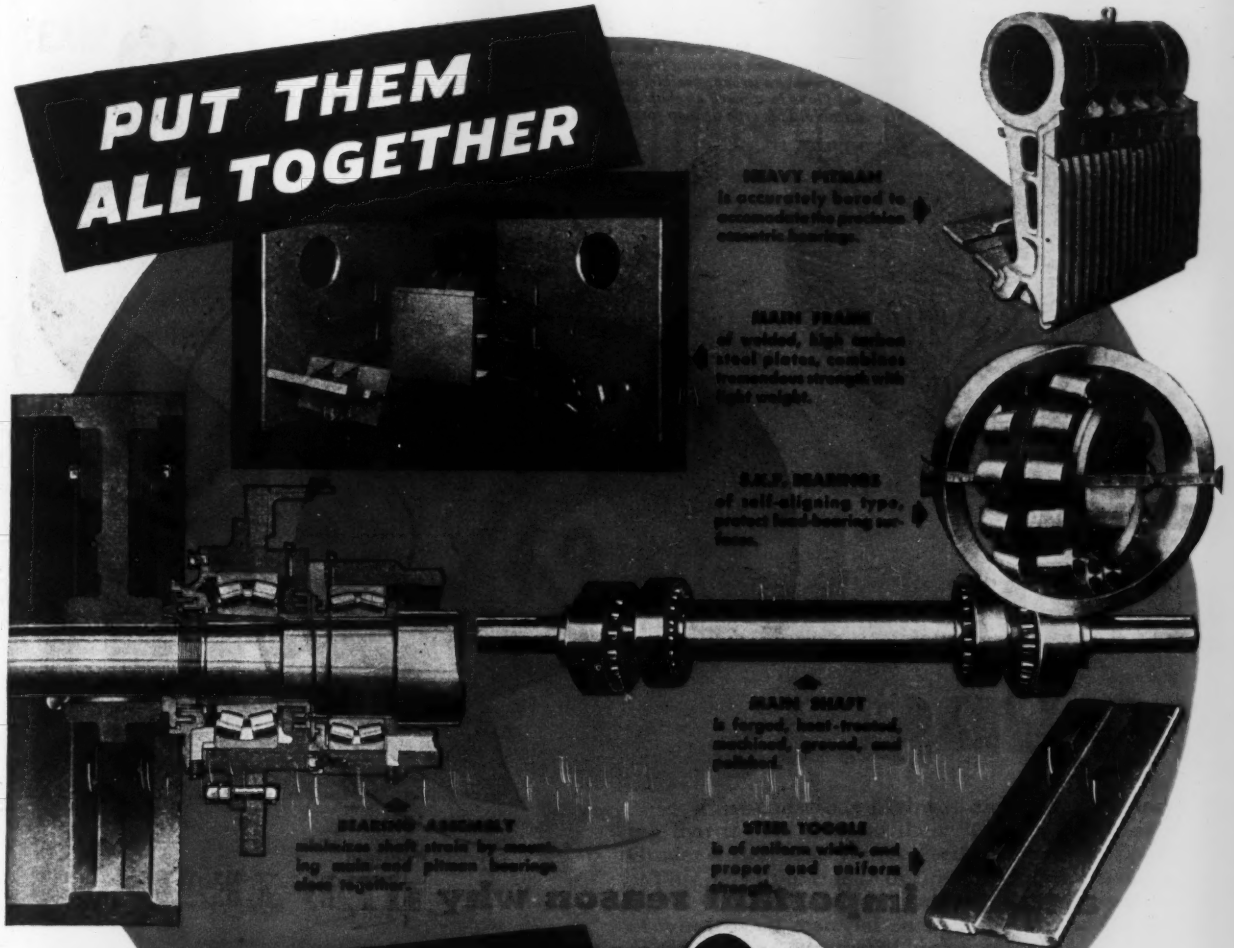
Write for Technical Publication 244

WALLACE & TIERNAN PRODUCTS, INC.

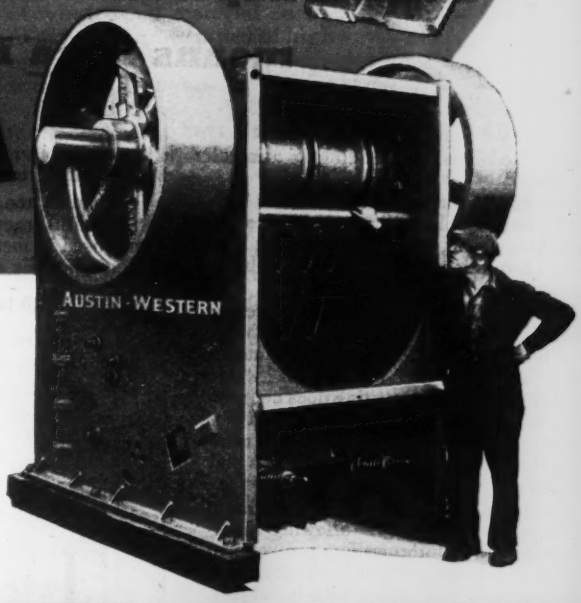
BELLEVILLE 9 NEW JERSEY

A-48

PUT THEM ALL TOGETHER


HEAVY PITMAN
is accurately bored to accommodate the precision eccentric bearings.
MAIN FRAME
of welded, high carbon steel plates, combines tremendous strength with light weight.
S.K.F. BEARINGS
of self-aligning type, protect head-bearing portions.
MAIN SHAFT
is forged, heat-treated, machined, ground, and polished.
BEARING ASSEMBLY
maintains shaft strait by mounting main and pitman bearings close together.
STEEL TOGGLE
is of uniform width, and proper and uniform strength.

AND YOU GET MAXIMUM ALL-AROUND PERFORMANCE



• Pictured on this page are but a few of the many exclusive features of design and construction which are responsible for the ability of *Austin-Western High-Speed Jaw Crushers* to exceed ordinary output standards by wide margins.

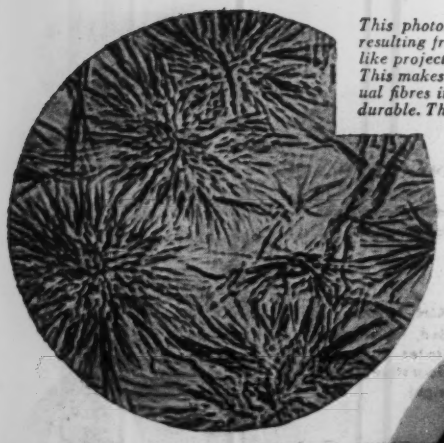
Bulletin 1960 tells the whole story. Your nearby A-W distributor will be glad to send you a copy.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.

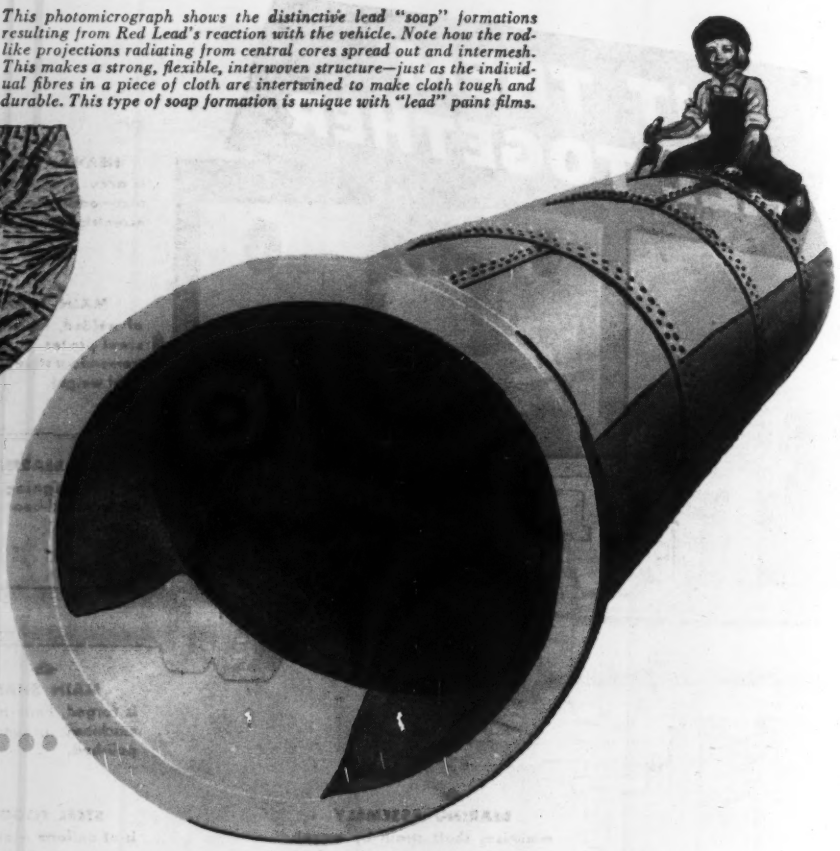
BUILDERS OF ROAD MACHINERY SINCE 1880

Austin Western

BUY MORE WAR BONDS



This photomicrograph shows the distinctive lead "soap" formations resulting from Red Lead's reaction with the vehicle. Note how the rod-like projections radiating from central cores spread out and intermesh. This makes a strong, flexible, interwoven structure—just as the individual fibres in a piece of cloth are intertwined to make cloth tough and durable. This type of soap formation is unique with "lead" paint films.



unique LEAD SOAPS...

another important reason why RED LEAD means Extra Rust Protection

Why is Red Lead outstanding as a metal protector?

One of the major reasons is this pigment's remarkable ability to impart to the paint film strong, tough, intertwining lead "soap" formations—as shown in the photomicrograph above.

These unique lead "soaps" improve the paint film in many ways. For one thing, they form a dense, intermeshing matrix which restricts the passage of water through the film. And rusting does not take place without the presence of moisture.

For another, they *mechanically* reinforce the film, giving it extra *strength* and *toughness*.

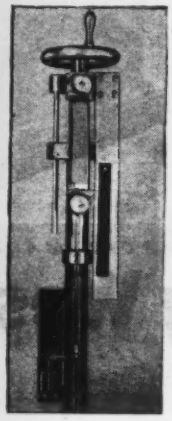
And again, Red Lead "soaps" contribute all-important *elasticity* — allowing movement along their intermeshing projections. This action helps prevent the ruptures to which a hard, unyielding film is subject. Moreover, when a paint film dries and ages, decomposition of the vehicle sets in. But, because of Red Lead's ability to combine with the decomposition products and form soaps, it increases both the durability of the paint film and its adhesion to the base metal.

Red Lead's extra strength, toughness and elasticity are demonstrated by the tensile strength test below and substantiated by exhaustive research and field service.

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.



* * *

In this tensile strength tester a typical Red Lead paint film has been stretched 18% without breaking. In withstanding this elongation it has maintained a load of 920 grams. Any film that exhibits these characteristics has unusual strength, toughness and elasticity. As metals expand and contract only a fraction of one percent, this film would adhere under the most extreme conditions.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

Write for New Booklet—"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas—ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

* * *

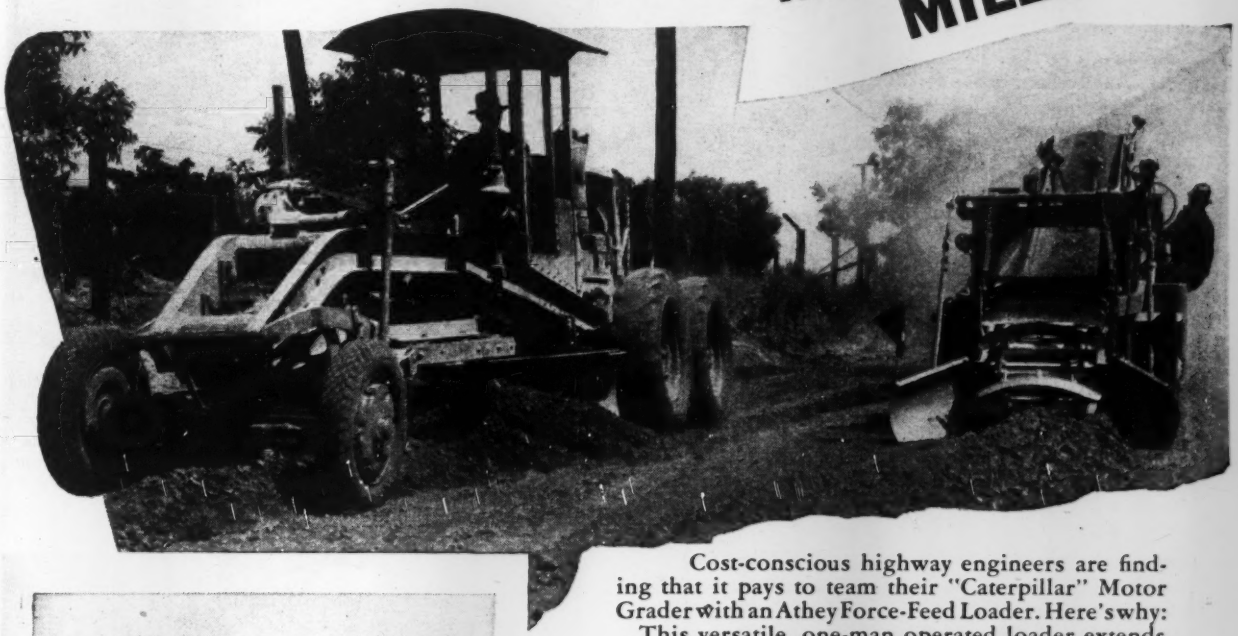
All types of metal protective paints are constantly being tested at National Lead's many proving grounds. The benefit of our extensive experience with Red Lead paints for both underwater and atmospheric use is available through our technical staff.

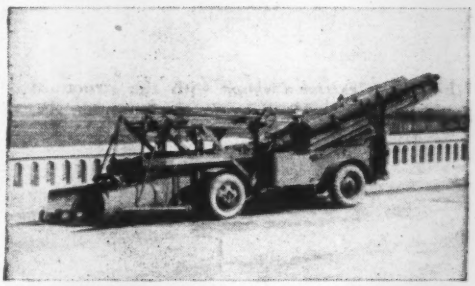
NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna); Philadelphia 7 (John T. Lewis & Bros. Co.); Charleston, W. Va. (Evans Lead Division).

DUTCH BOY RED LEAD

TEAM YOUR "CATERPILLAR" MOTOR GRADER WITH A FORCE-FEED LOADER

FOR LOWER COST MAINTENANCE MILES





TRAVELS UNDER ITS OWN POWER

The Athey Force-Feed Loader is a self-propelled, mobile unit . . . travels from job to job at highway speeds . . . saves truck time and eliminates transportation problems.

Cost-conscious highway engineers are finding that it pays to team their "Caterpillar" Motor Grader with an Athey Force-Feed Loader. Here's why:

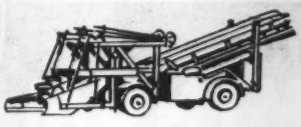
This versatile, one-man operated loader extends Motor Grader usefulness. Its speedy, clean handling of windrowed material enables the Motor Grader to maintain more miles of highway . . . thus slashing operating costs and helping solve your manpower shortage problems.

The Athey Force-Feed Loader is fast and handy for loading surplus materials on a variety of maintenance and construction jobs, such as ditch cleaning, road grading, widening and straightening, slope trimming, building and relocating ditches, salvaging top soil and loading oil mix.

Your Athey-"Caterpillar" dealer has complete information on how to extend your "Caterpillar" Motor Grader's usefulness by equipping your highway crew with an Athey Force-Feed Loader. See him today, or write direct to Athey Truss Wheel Co., 5631 West 65th Street, Chicago 38, Illinois.

★ Athey FORCE-FEED LOADERS

DEPENDABLE LOADING AND HAULING EQUIPMENT



FORCE-FEED LOADERS

FORGED-TRAK TRAILERS

MOBILOADERS

Contrast this *Alcoa extruded shape* with the structural member you'd have to build up to do a comparable job.

Possibilities of the extrusion process surprise the uninitiated. Extrusions save on fabricating labor. They often simplify a design, saving more weight and giving it greater use-value.

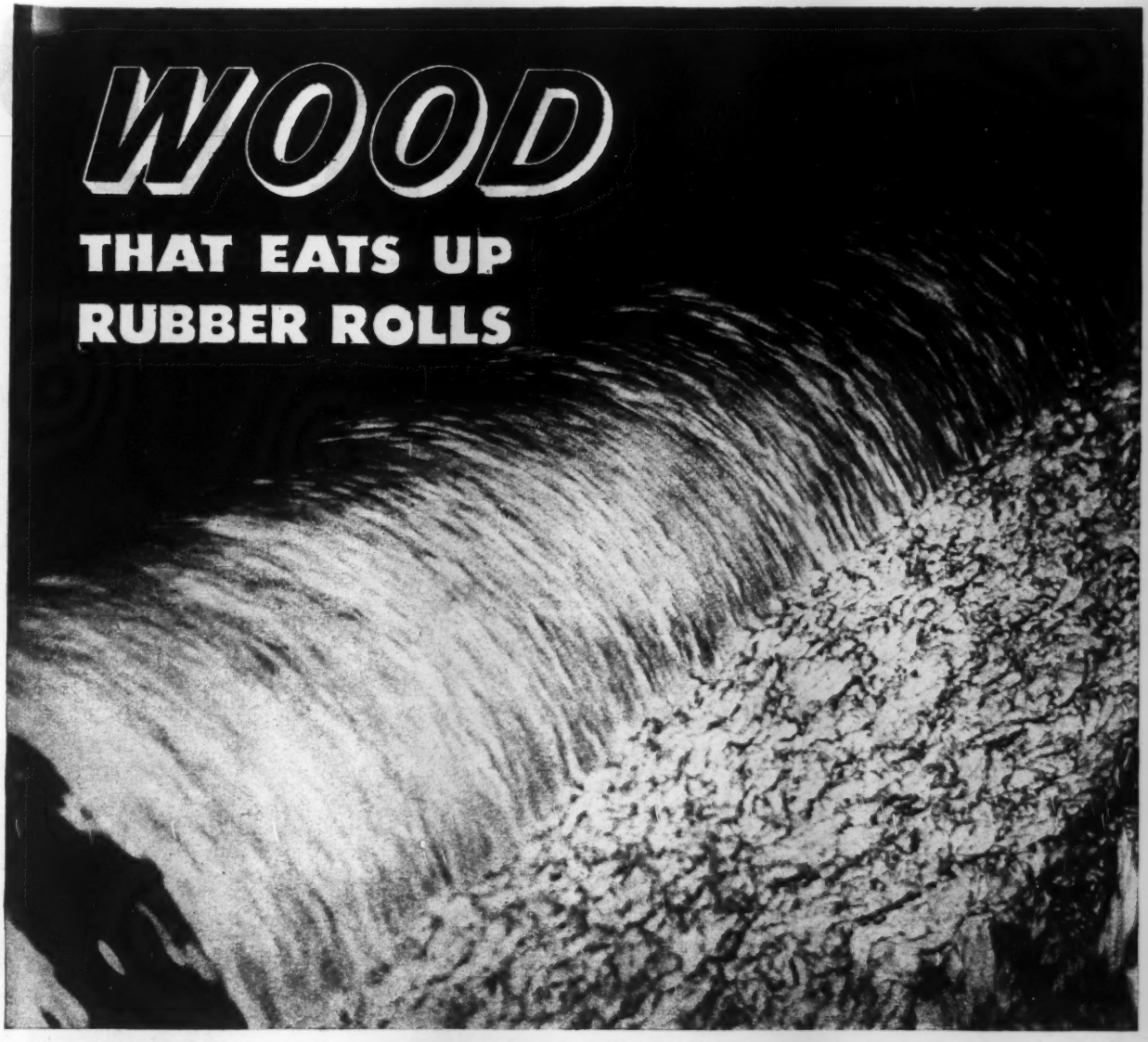
Aluminum is employed most efficiently, being placed exactly where needed for utility and strength. No excess metal for joining purposes. No rivets to add extra weight.

Dies for the extrusion of aluminum are very reasonable in cost. Our engineers will gladly discuss the shapes you need and help you figure what you'll gain by going to Alcoa Aluminum extruded shapes. ALUMINUM COMPANY OF AMERICA, 2108 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM

ALCOA ALUMINUM

WOOD
THAT EATS UP RUBBER ROLLS



In a new paper mill, it was found that one type of roll was literally being "eaten up" by certain materials inherent in the ground wood stock.

After several such rolls made of natural rubber compounds had disintegrated, U. S. Rubber Engineers were asked for suggestions. A roll fabricated of a special synthetic rubber compound was recommended.

This has proved entirely "indigestible" to the wood stock . . . has already delivered many more months of service than the rolls tried previously . . . is setting up a record for steady, trouble-free service.

Our Engineers have been finding the answers to industrial rubber problems like this for many years...developing special compounds that overcome unusual conditions. When you encounter such a problem, let us help you solve it!

SERVING THROUGH SCIENCE WITH ENGINEERED RUBBER

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony Program. CBS network, Sunday afternoon 3:00 to 4:30 E.W.T.

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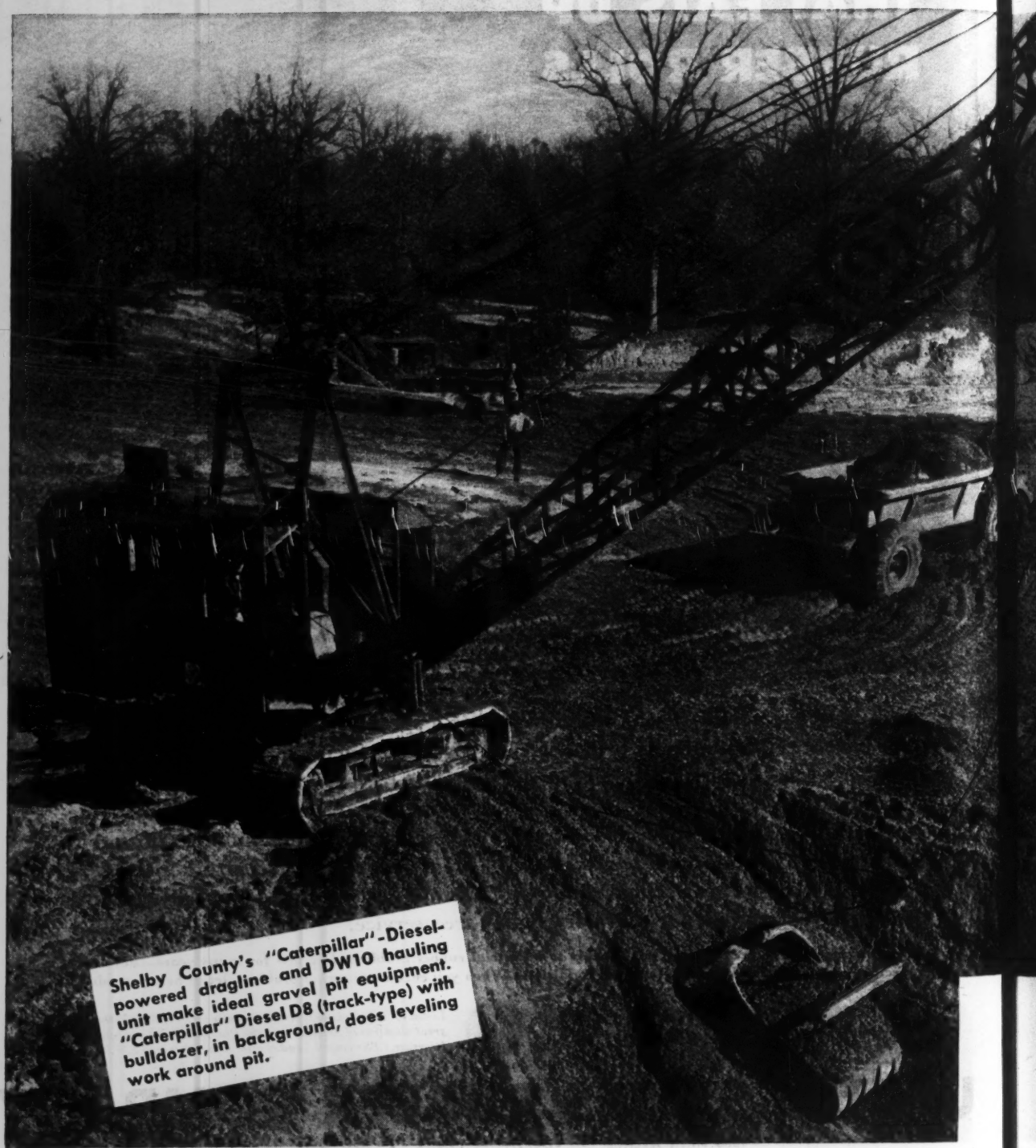
TAKE A TIP



Shelby County's "Caterpillar"-Diesel-powered dragline and DW10 hauling unit make ideal gravel pit equipment. "Caterpillar" Diesel D8 (track-type) with bulldozer, in background, does leveling work around pit.

FROM TENNESSEE

Shelby County standardizes on "Caterpillar" Diesel equipment and "zones" it for LOWEST COSTS ON EARTH

The right piece of equipment for each type of job, plus all equipment from one quality line backed by one efficient service-dealer . . . this is the formula of more and more contractors, county commissioners and municipal officials for giving taxpayers the most for their money in improvement and maintenance projects of various sorts.

The officials of Shelby County, Tennessee, are among the foremost proponents of this modern, efficient, cost-saving idea. This County owns and operates the following "Caterpillar" Diesel machines:

2 D8 Tractors **1 D7 Tractor**
5 Motor Graders
1 DW10 Tractor (wheel-type) and Wagon★
1 dragline powered with a "Caterpillar" Diesel Engine

Thus, excavating, clearing, grading, filling, short hauls, long hauls — everything relating to earthmoving—are handled in the best way for saving time and operating costs.

Since "Caterpillar" dealers handle and service a complete range of equipment, they can be impartial in their recommendations — both on the over-all needs of a county or contractor and on *zoning* equipment for the lowest costs on earth. "Caterpillar's" field engineers will gladly help you with any of your earthmoving problems.

CATERPILLAR TRACTOR CO., Peoria, Ill.

A Shelby County "Caterpillar" Diesel Tractor. Operates bulldozer, scraper, ripper, tamper, drag, etc. Five "Caterpillar" Diesel Motor Graders (not illustrated) do grading, ditch clearing, bank sloping, shoulder building, roadmix, etc.

★This Shelby County "Caterpillar" DW10 with "Caterpillar" W10 Wagon is shown working on a 6-mile haul (12 miles round trip)—providing fast distance hauling. Outfit has approximately 15,000 working hours already to its credit.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

The discharged veteran wears this emblem. Remember his service and honor him.

"Common Sense Applied to Spending"

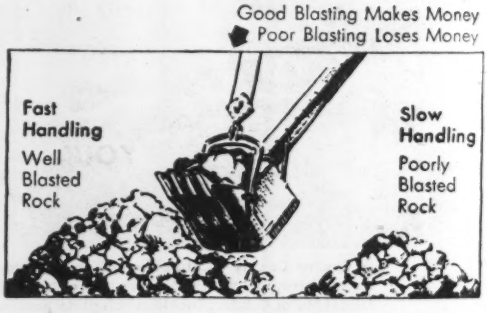
. . . that's how to buy explosives, too

Buying hats and buying explosives have one thing in common—the wrong purchase is no bargain. Price is not the first consideration; it is "what it does for you" that really counts.

So saving on the initial cost of explosives is a false kind of thrift. Often it *increases* expense. It's just common sense to analyze your blasting problem —then choose the *right* explosive for the best results in blasting.

Efficient blasting insures good fragmentation. It increases production—gets more work out of your equipment. Poor breakage is hard on the shovel—lowers daily production.

Your Atlas Representative is a competent blaster. He has 120 different explosives at his command—backed by years of company experience on the best way to use them. Put his up-to-date "know how" to work for you. It will help you produce *real* operating economies.



ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

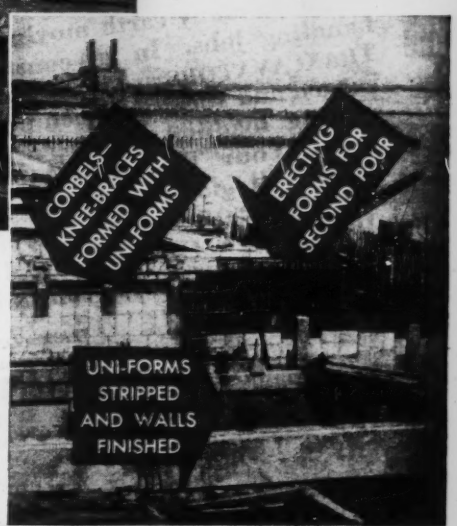
ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Adventures of THE UNI-FORM FAMILY

Concrete Form Specialists for 33 Years

YOU CAN USE ME WHERE YOU WANT --I REALLY GET AROUND--PUT ME ON ANY STRUCTURE. I'M VERSATILE --I'LL WORK ANYWHERE.

SAVE TIME *AND* MONEY *USE* UNI-FORMS



Adaptability of Uni-Forms makes them particularly valuable for the wide variety of structural requirements encountered in modern building construction. *Strategically located* stocks of Uni-Forms are immediately available on a rental basis. *Engineering Counsel* regarding the practicability of Uni-Forms is yours for the asking.

RENT US FOR YOUR NEXT JOB

⊙ Main Office and Plant
★ Factory Branches Distributors in all Principal Cities
Chicago
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San Francisco
Los Angeles
Atlanta
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Factory Branches: Atlanta . . . Cleveland . . . Houston . . . Los Angeles . . . New York . . . San Francisco

Universal FORM CLAMP CO.

Concrete Forms, Equipment and Accessories

WHEN THERE'S WORK TO BE DONE...

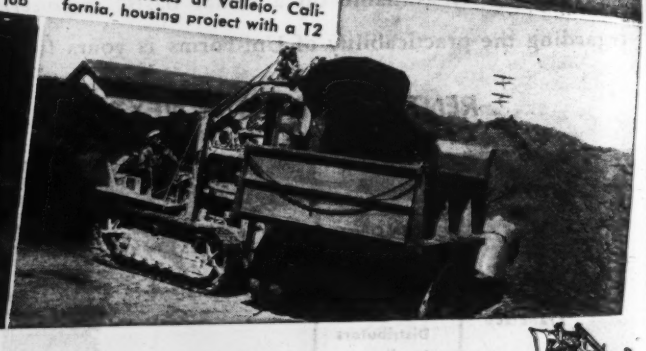
-TRAXCAVATE

T7 TRAXCAVATOR on big excavation job in St. Louis, Missouri

IT'S the practical, speedy, profitable way to do many earth moving and material handling jobs. In all construction work, TRAXCAVATORS are recognized as the most rugged and versatile machines for digging, grading, loading, carrying and many other tasks. Your TRACKSON-"Caterpillar" dealer will gladly give you the complete TRAXCAVATOR story, or write to TRACKSON COMPANY, Dept. EN-65, Milwaukee 1, Wisconsin.

A T2 tight-excavating in small basement at Cheyenne, Wyoming

TRAXCAVATOR fine-grading between forms on Indiana road job



Loading trucks at Vallejo, California, housing project with a T2

DIGS · GRADES

TRAXCAVATOR

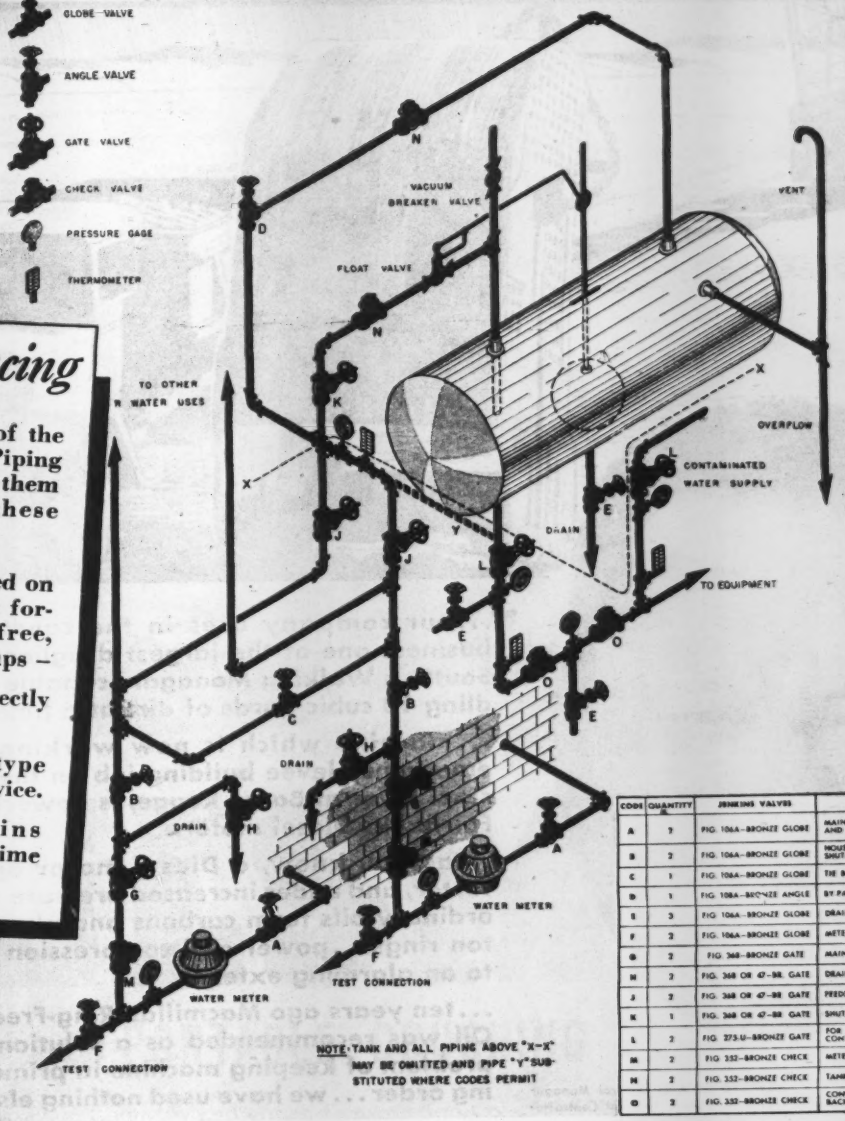
(REG. U. S. PAT. OFF.

THE ORIGINAL TRACTOR EXCAVATOR

LOADS · CARRIES

Jenkins PRACTICAL PIPING LAYOUTS 1

CITY WATER SUPPLY TO CONTAMINATED WATER SYSTEM



CODE	QUANTITY	JENKINS VALVES	SERVICE
A	2	FIG. 106A–BRONZE GLOBE	MAIN SERVICE SHUT-OFF AND CONTROL
B	2	FIG. 106A–BRONZE GLOBE	HOUSE HEADERS – SHUT OFF AND CONTROL
C	1	FIG. 106A–BRONZE GLOBE	TIE BETWEEN HEADERS
D	1	FIG. 108A–BRONZE ANGLE	BY-PASS AROUND FLOAT VALVE
E	3	FIG. 106A–BRONZE GLOBE	DRAINS
F	2	FIG. 106A–BRONZE GLOBE	METER TEST
G	2	FIG. 368–BRONZE GATE	MAIN SERVICE SHUT OFF
H	2	FIG. 368 OR 47–BR. GATE	DRAINS FOR HEADERS
J	2	FIG. 368 OR 47–BR. GATE	FEEDS TO TANK FILL LINE
K	1	FIG. 368 OR 47–BR. GATE	SHUT-OFF FOR FLOAT VALVE
L	2	FIG. 273-U–BRONZE GATE	FOR CONNECTION FEEDING CONTAMINATED WATER SUPPLY
M	2	FIG. 352–BRONZE CHECK	METER BACK FLOW PREVENTION
N	2	FIG. 352–BRONZE CHECK	TANK BACK FLOW PREVENTION
O	2	FIG. 352–BRONZE CHECK	CONTAMINATED WATER SUPPLY BACKFLOW PREVENTION

Introducing

A NEW SERIES of the popular Jenkins Piping Layouts. Watch for them each month in these pages.

Each layout is based on the proved 3-point formula for trouble-free, time-defying hookups –

1. Place valves correctly in the lines.

2. Use the right type valve for the service.

3. Choose Jenkins Valves for lifetime economy.

City and State Laws require that contamination of city water be made impossible when a secondary, impure source of water is used for cooling, boiler feed, etc. This layout presents an economical hookup to meet all requirements. Local codes vary, and obviously could not all be allowed for. Jenkins recommends consultation with accredited engineers and contractors when adapting these suggestions to your specific requirements.

Copies of This Layout No. 1, enlarged, with complete details of all valve specifications, will be furnished on request by Jenkins Engineers.

OVER 600 JENKINS VALVES TO FIT YOUR PLANS

When you plan your piping layouts, you will rarely need a valve you can't find in the JENKINS CATALOG. Over 600 patterns are listed, for every type of service.

That means you save time – by selecting all the valves you need from one source. It also means you get the advantages of Jenkins *better* design, *better* materials, and *better* workmanship for every control point on your lines . . . at no higher cost than for other good valves.

Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal; London, England.

LOOK FOR THIS DIAMOND MARK SINCE 1864

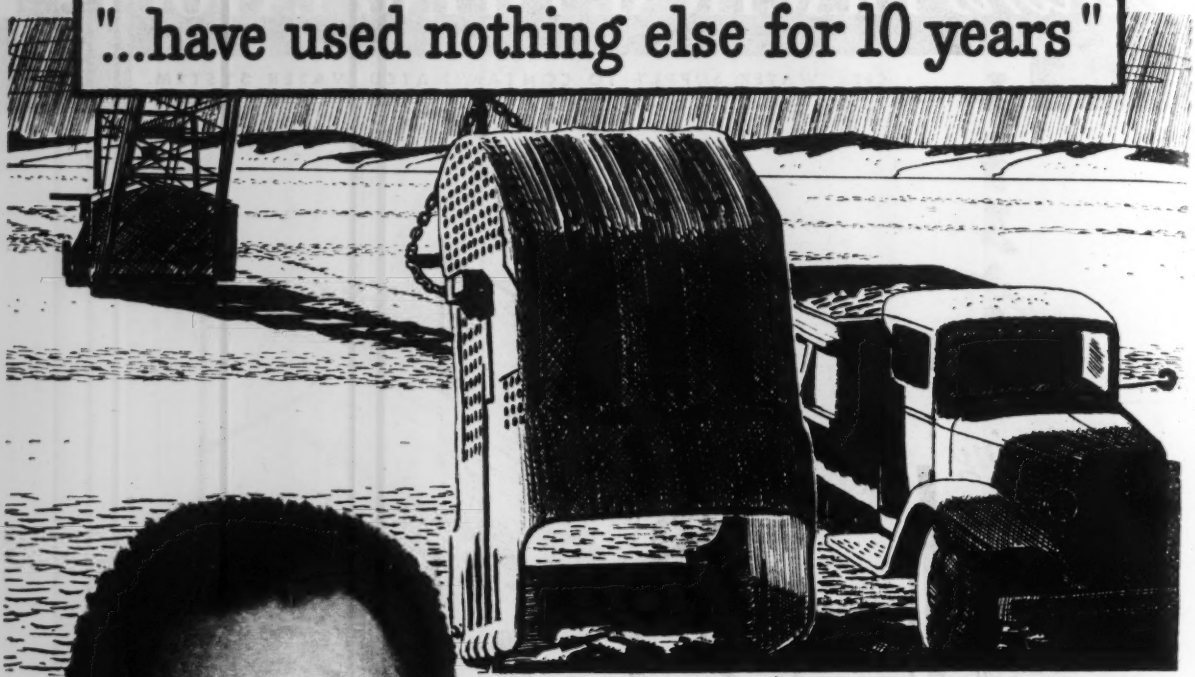
JENKINS VALVES

BRONZE • IRON • STEEL AND CORROSION-RESISTING ALLOYS

For every industrial, engineering, marine, plumbing-heating service . . . 125 to 600 lbs. pressure.

Sold Through Reliable Distributors Everywhere

"...have used nothing else for 10 years"



FROM LOUISIANA

EDWARD SWAN, General Manager
Walter P. Villere, General Contractor
New Orleans, Louisiana

One of a series of testimonial letters received from all parts of the United States

"...our company uses in the construction business one of the largest draglines in the South, a Walking Monagan, capable of handling 10 cubic yards of dirt at a time.

...machine which is now working on an emergency levee building job on the Mississippi River at Baton Rouge, is powered by a Fairbanks Diesel motor.

...as you know, a Diesel motor operates faster, and under increased pressure of heat, ordinary oils form carbons and plug up piston rings...power and compression are cut to an alarming extent.

...ten years ago Macmillan Ring-Free Motor Oil was recommended as a solution to the problem of keeping machine in prime working order...we have used nothing else since.

...having been around machinery all my life, have yet to see any other motor oil accomplish in both Diesel and gasoline motors what Macmillan Ring-Free can do."

Excerpts of letter from– Edmund Swan

Other equipment operated by Villere Company: two P H Shovels, 1¼ yard capacity with Waukesha motors; four 1½-Ton Ford Trucks, one 1½-Ton International, one 1-Ton Diamond T; 1940 Imperial Chrysler, 1942 Oldsmobile, 1936 Chrysler, 1941 Plymouth. On Macmillan Ring-Free, of course!

MACMILLAN RING-FREE MOTOR OIL

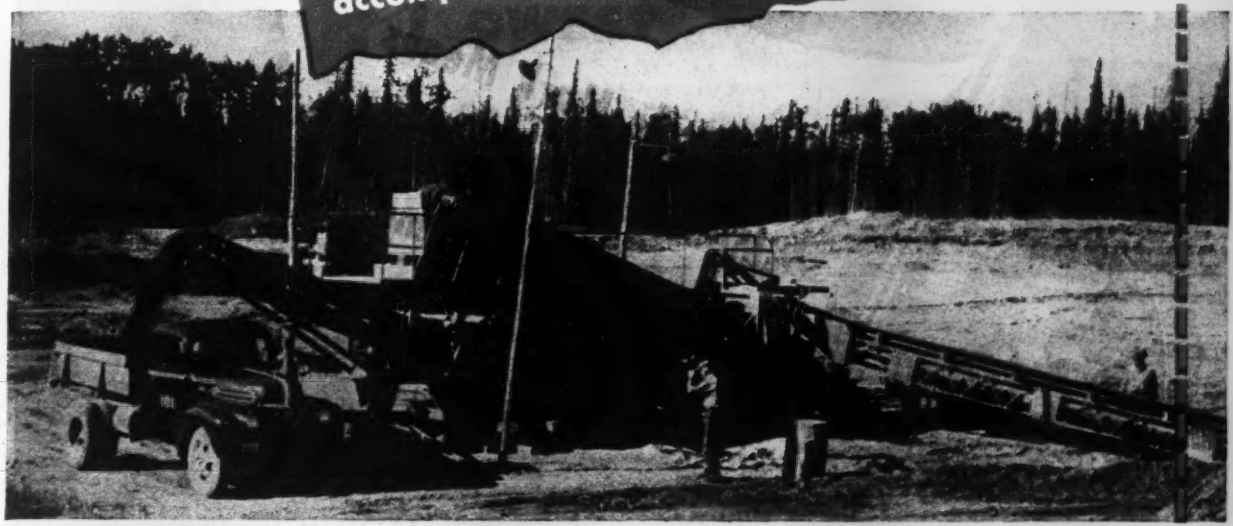
Operators of all types of equipment report lower-cost, more efficient performance with Macmillan Ring-Free Motor Oil. Find out how it can help lick your toughest lubrication problems... Phone or write the nearest Macmillan office.

MACMILLAN PETROLEUM CORPORATION

80 W. 50th Street, New York 20 • 624 So. Michigan Avenue, Chicago 5 • 530 W. Sixth Street, Los Angeles 14 • Copyright 1945, Macmillan Petroleum Corporation

"We averaged 141 tons per hour ... we crushed over 50,000 tons on this job ... very nicely accomplished with this unit"

On an Alaskan construction job, this Telsmith Dual Portable Crushing Plant is turning out top tonnage.



TELSMITH

Dual PORTABLE CRUSHING PLANT

C. F. Lytle Company and Green Construction Co. of Des Moines, Iowa, had an airport job in Alaska. Every hour counted and they "needed a lot of tonnage per hour." They got it. This Telsmith Dual Portable Crushing-Screening Plant averaged 141 t.p.h—with 30-35 per cent of the material requiring crushing. The job took over 50,000 tons—all of which had to pass a one-inch screen and be graded to U.S.E.B. specifications. A D-8800 Diesel engine supplied the power. On another Alaskan job the Telsmith Dual produced aggregate for inverted penetration seal-coat work—100 per cent of which had to pass the 3/8-inch screen. Find out about the flexibility of Telsmith Portable Plants and why they turn out aggregate *fast* and *economically*—get Bulletin P-2.

P-11

SMITH ENGINEERING WORKS, 500 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

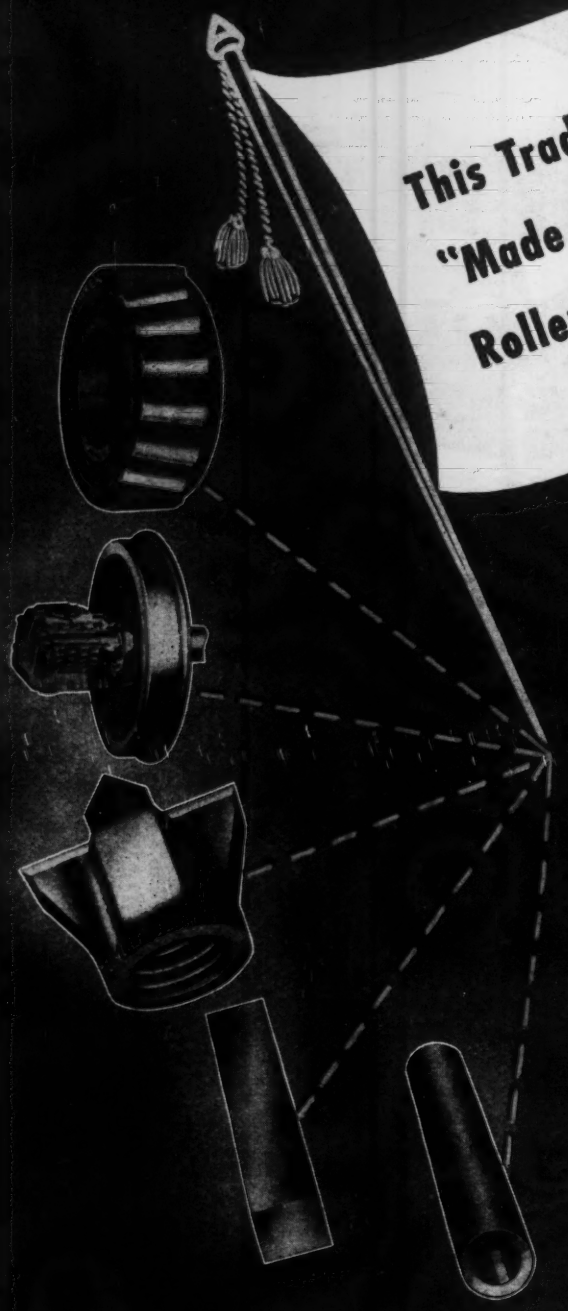
51 East 42nd St. New York 17, N.Y. | 211 W. Wacker Drive Chicago 6, Ill. | 713 Commercial Trust Bldg. Philadelphia 2, Pa. | 247 Third Street Cambridge 42, Mass. | Boehck Eqpt. Co. Milwaukee 3, Wis. | Mines Eng. & Eqpt. Co. San Francisco 4—Los Angeles 14

Brandeis M. & S. Co. Louisville 8, Ky. | Rish Equipment Co. Charleston 22, & Clarksburg, W. Va. | Rish Equipment Co. Roanoke 7, & Richmond 10, Va. | North Carolina Eqpt. Co. Raleigh and Charlotte 1, N.C. | Wilson-Weesner-Wilkinson Co. Knoxville 8, & Nashville 6, Tenn.

Printed in U. S. A.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.



This Trade-Mark Means "Made By The Timken Roller Bearing Company"

Wherever you find it—on tapered roller bearings, alloy steel, seamless steel tubing, or rock drilling bits, it identifies a genuine Timken product with all that this implies—superior quality, performance and endurance.

These inherent advantages are not visible; they are revealed only in service, but you can be sure of getting them in full by making sure that the trade-mark "TIMKEN" is on every tapered roller bearing, every bar of alloy steel, every seamless steel tube and every rock bit you buy.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

Flash — On every competitive test to date, LaPlant-Choate's new 8-yard cable-operated scraper has "run rings around" all other competitive scrapers tested. A limited number are already in the field, with everything set for economical mass production as soon as military conditions permit. You'll agree — it's a scraper well worth waiting for!

TRADE MARK

THOUSANDS OF SATISFIED OWNERS AGREE

It's LPC for LOWEST POSSIBLE COST

There are many good reasons why thousands of successful operators who have been using LaPlant-Choate rigs for years will keep right on buying them after the war. For one thing, these long-time users know from experience that LPC dozers and scrapers consistently move more yardage faster and at lower cost. They also know that LaPlant-Choate performance and dependability have been *job-proved around the world* under all types of conditions. And best of all, these veteran operators know that LaPlant-Choate will continue to lead the way in developing new improvements because LPC's entire organization is *strictly "tractor-equipment-minded"* . . . with more years of specialized "know-how" than any other company in the industry. So it all adds up to LPC—for lowest possible cost and better results—on your jobs, too. See your LPC-"Caterpillar" distributor today. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, California.

ARMY E NAVY

LAPLANT CHOATE

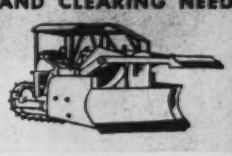
EARTHMOVING AND LAND CLEARING EQUIPMENT

THERE IS A JOB-PROVED LA PLANT-CHOATE RIG FOR EVERY EARTHMOVING AND LAND CLEARING NEED

ALL TYPES OF DOZERS — Straight or angling blade, hydraulic or cable operated, for every size of track-type tractor.

LARGE OR SMALL SCRAPERS — Hydraulic or cable operated, front or rear dump, for use with your wheel or track-type tractors.

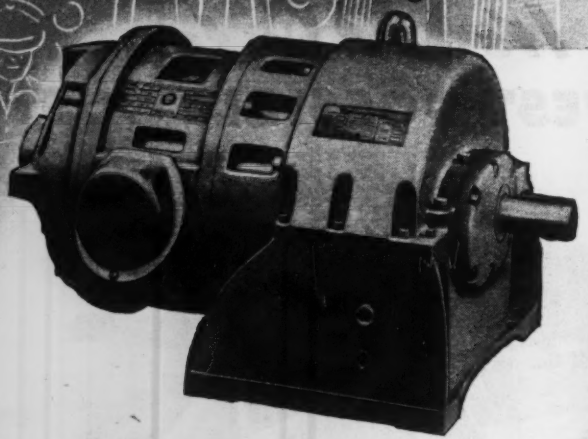
CABLE OPERATED RIPPERS — For ripping up hard ground, shale or concrete to facilitate loading with LPC "Carrimor" Scrapers.



LAND CLEARING TOOLS — A complete line of Brush Cutters, Treedozers, Rootcutters and Brush Rakes—all are interchangeable.

Modernize with "Packaged Drive"

Westinghouse GEARMOTORS and Speed Reducers



Save Space
Save Installation Time
Reduce Maintenance
Increase Safety
Improve Appearance

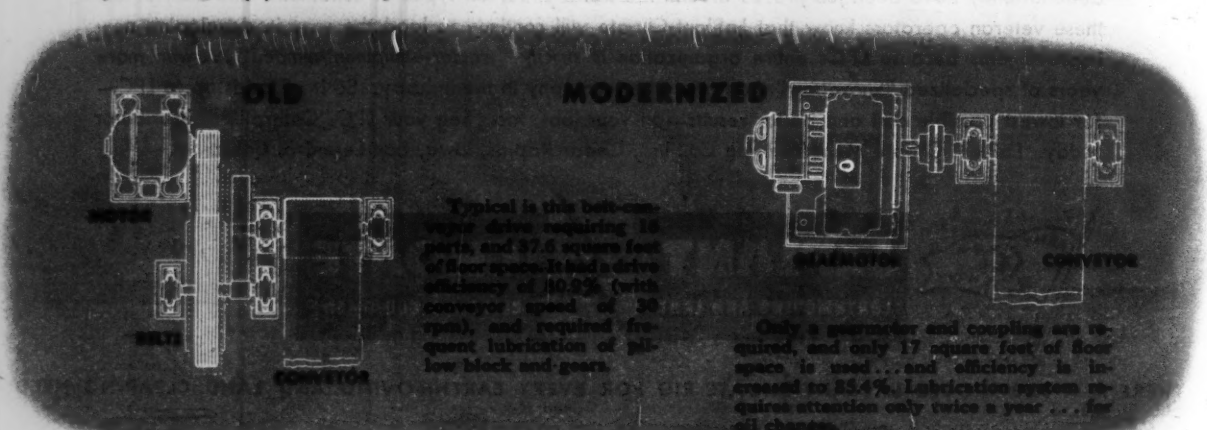
Gearmotors come complete in one "package"...ready for operation

Check up on your motor drives. Reconversion problems put a premium on their efficiency and economy.

Since the widespread use of gearmotors almost twenty years ago, performance records have proved them to be the most economical answer to drives which need speed reduction...and four out of every five drives do need speed reduction.

The efficiency of gearmotors stems from two major savings: (1) reduced power losses...no belts, ropes, and pulleys, etc.; (2) longer life and reduced outage time...maintenances seldom more than oil changes.

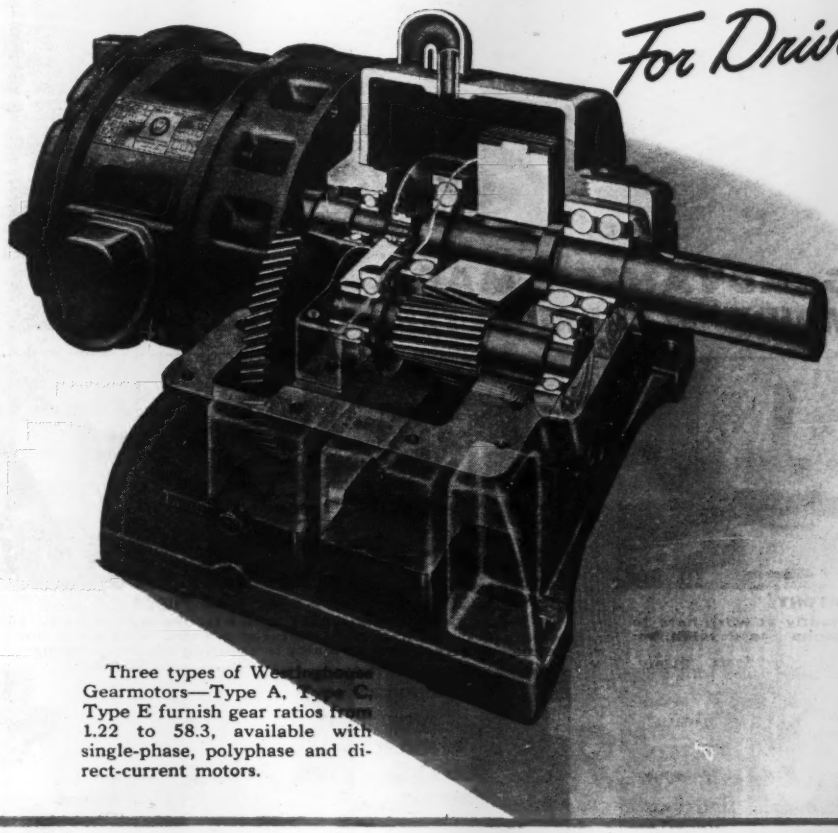
It's important, too, that your drives are engineered from one responsible source. When you come to Westinghouse you get undivided responsibility...the motor and gears are built by one manufacturer. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-07231


OLD
MODERNIZED
MOTOR
BELTS
CONVEYOR
GEARMOTOR
CONVEYOR
Typical is this belt-conveyor drive requiring 16 parts, and 37.6 square feet of floor space. It had a drive efficiency of 80.9% (with conveyor speed of 30 rpm), and required frequent lubrication of pillow block and gears.
Only a gearmotor and coupling are required, and only 17 square feet of floor space is used...and efficiency is increased to 85.4%. Lubrication system requires attention only twice a year...for oil changes.

Westinghouse

There is a Westinghouse speed reduction unit for most application needs

For Drives of 1 to 75 hp



Three types of Westinghouse Gearmotors—Type A, Type C, Type E furnish gear ratios from 1.22 to 58.3, available with single-phase, polyphase and direct-current motors.

HERE ARE 9 GOOD REASONS WHY YOU SHOULD INSTALL WESTINGHOUSE GEARMOTORS:

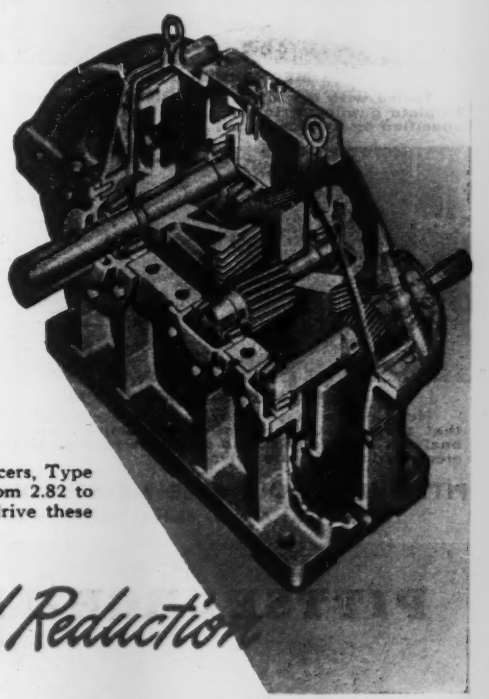
1. FEWER PARTS TO WEAR.
2. BPT "TOUGH-HARD" GEARS AND PINIONS.
3. USE ALL WESTINGHOUSE MOTOR TYPES.
4. HIGH EFFICIENCY.
5. POSITIVE LUBRICATION.
6. EASY ACCESSIBILITY.
7. IMPROVED FOUNDATION STABILITY.
8. MOTOR AND GEARS BUILT BY ONE MANUFACTURER.
9. DESIGNED AND APPLIED TO A.G.M.A. STANDARDS.

For Drives up to 1000 hp

Here are seven good reasons why you should install

Westinghouse Speed Reducers

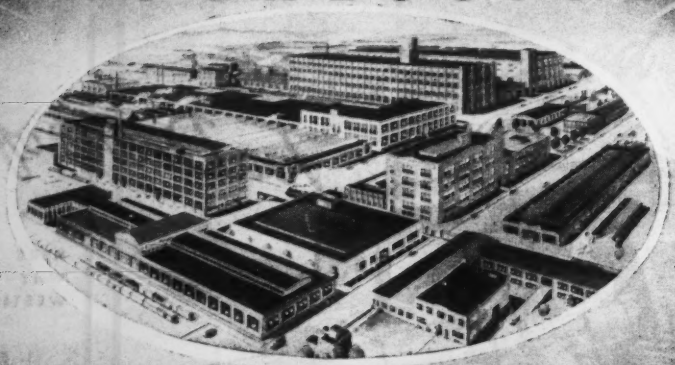
- Antifriction bearings
- Simple, positive lubrication
- Heat-treated helical gearing
- Liberally proportioned gear cases assure alignment of rotating parts
- Low power loss for high efficiency
- Rugged case—split construction for easy accessibility
- Hob cutting assures high precision gears



Two major types of Westinghouse Speed Reducers, Type SH and Type DH, offer speed reduction ratios from 2.82 to 70.5. Westinghouse also furnishes the motor to drive these units—for a complete installation.

4 out of 5 drives need Speed Reduction

PROGRESSIVE!



NEVER-ENDING ADVANCES MARK THE PATH OF PITTSBURGH-EMPIRE WATER METER DEVELOPMENTS

DEVELOPMENT LABORATORY

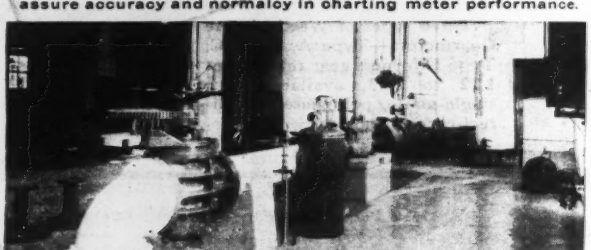
Skilled researoh engineers are constantly at work here to better the performance of existing designs—to develop improved designs for the future.

LABORATORY TESTING PLANT

Precision water meter testing is a laboratory necessity. The small meter testing plant pictured is fitted with every aid to assure accuracy and normaloy in charting meter performance.

MECHANICAL LABORATORY

Tooled with the latest in precision equipment. Skilled machinists duplicate, in materials, the dimensional exactness specified by the designers.



LARGE METER TESTING

Large meters are tested in this modern plant which is equipped with every facility to measure maximum capacity flows and to expedite handling.

CHEMICAL LABORATORY

Here all purohased raw materials are checked to assure that they meet specifications; chemical and metallurgical analysis is performed, and problems relating to corrosion and electrolytic action are solved.

STANDARDS DEPARTMENT

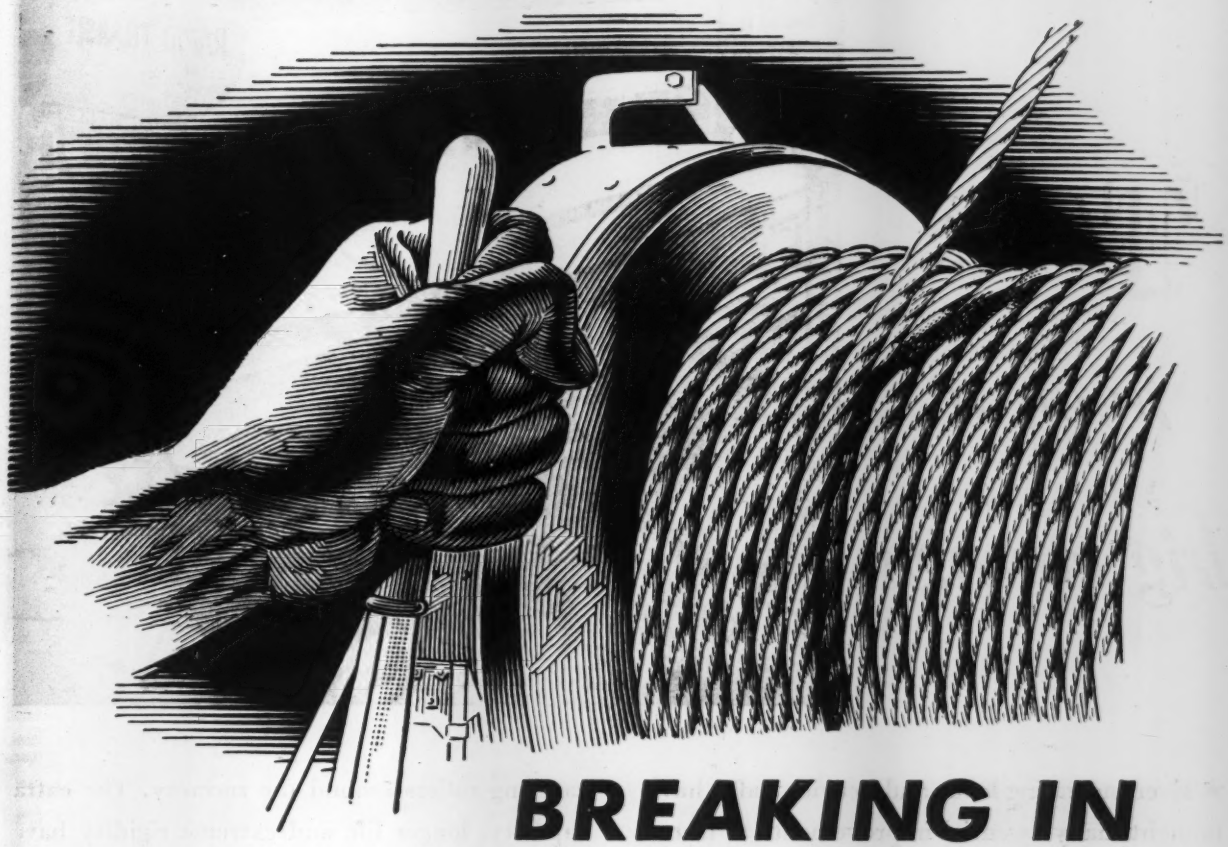
This air-conditioned section is the backbone of quality control. Here every manufacturing tool, fixture, and gauge is checked for wear on regular schedule with precise measuring instruments.

PITTSBURGH EQUITABLE METER COMPANY. Main Offices: 400 Lexington Avenue, Pittsburgh 8, Pa.

Branches: Atlanta, Boston, Chicago, Houston, Kansas City, Los Angeles, New York, San Francisco, Seattle, Tulsa

PITTSBURGH-EMPIRE *Water Meters*

Take the full load sooner!



BREAKING IN

the new line is a short job with *PREFORMED* YELLOW STRAND

Let's agree that "slow and easy" is a good rule for putting most equipment to work — *Preformed* Yellow Strand included. Proper adjustment between wire rope and other operating parts extends rope life.

But a prolonged slowdown for starting a new rope is expensive. And it's *unnecessary* with *Preformed* Yellow Strand, because the factory process that preshapes wires and strands is equivalent to a *preliminary break-in.*

When flexible *Preformed* Yellow Strand reaches you it is notably relieved of internal stresses. You save much of the time that would be spent trying to relax the stiffness of a corresponding unpreformed rope. After a short, gradual stepping up—to bed the strands firmly on the core—you can take the full load.

The same rope tractability aids production in other ways. *Preformed* Yellow Strand is installed quickly. It resists kinking... stays in the sheave grooves... curbs overwinding on the drum.

Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

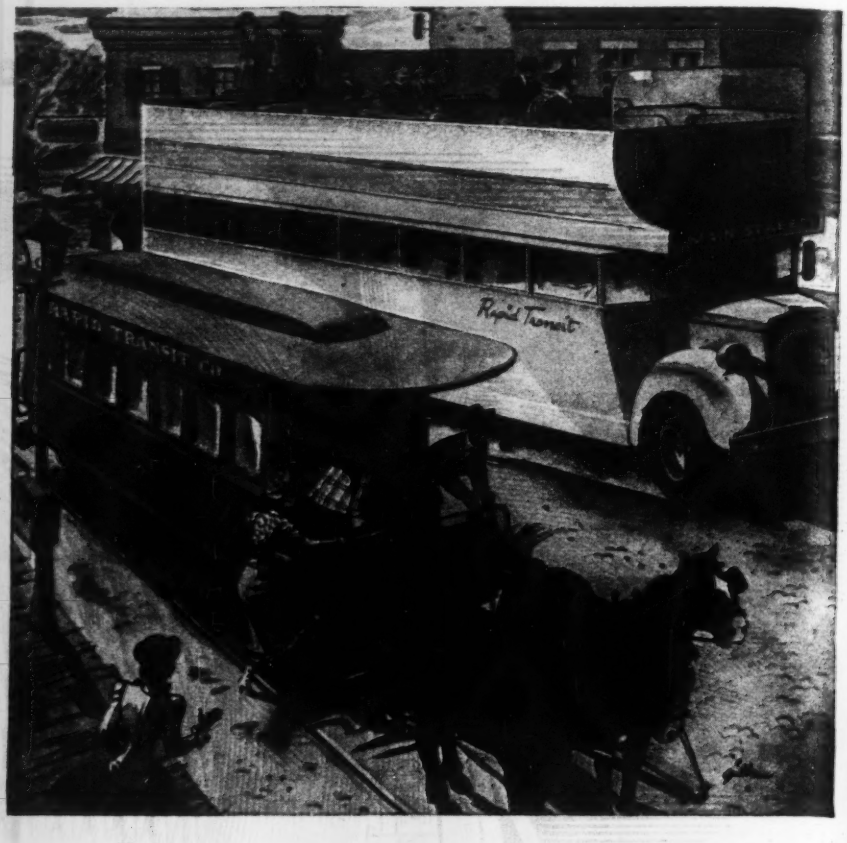
HAND BOOK FREE: "Industrial Wire Ropes" contains useful facts, tables, pictures. Write for your copy.

BRODERICK & BASCOM

Yellow Strand

PREFORMED WIRE ROPE

There's been a big change



★ Ever-increasing loads and heavier traffic have brought many essential improvements to transportation since the horse-car era . . . but only one outstanding change in tapered roller bearings.

That improvement came when Tyson developed the "all-rolls" design, with 30% more load-carrying rollers around the raceway. The extra capacity, longer life and extreme rigidity have won for Tyson an enviable reputation among operators of heavy-duty equipment.

If yours is a "tough job," count on Tyson to take it.

TYSON BEARING CORPORATION, MASSILLON, OHIO

COUNT THE ROLLS · THE ROLLS COUNT

Tyson

THE LAST WORD IN ANTI-FRICTIONEERING

★ BUY WAR BONDS FOR KEEPS ★

PLAN TODAY FOR YOUR POWER TOMORROW

Above: International TD-18 Diesel TracTracTor making a fill. Below: International TD-9 Diesel Wheel Tractor compacting a subgrade.

FOR YEARS International Power has been a partner in the achievements of the construction industry. When the Pacific war is finally won, and International Power is again available in needed quantity, it will play an important part in the great program of peacetime construction and reconstruction.

International Power includes TracTracTors, Wheel Tractors, and Power Units, both Diesel and gasoline. These time-tested, war-proved tractors and engines bear the stamp of International Harvester's years of engineering and manufacturing know-how.

Plan now for your postwar power needs, even though the Armed Forces must still be given the major share of current tractor and engine production. Let the International Industrial Power Distributor analyze those needs with you and recommend the particular kind and size of International Power equipment your work calls for.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL POWER

HINES "KNOW HOW"

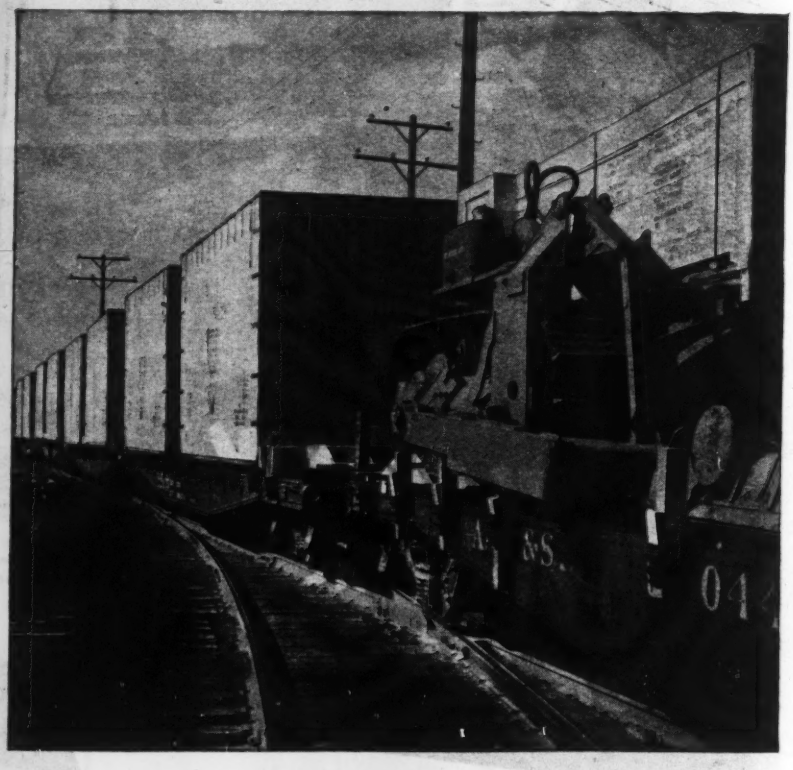
Gets machines into the fight!

EXPORT BOXES FOR CATERPILLAR . . . . .

For protection in shipment to far-flung fighting fronts, rugged Caterpillar "bull-dozers" are boxed in water-proof containers fabricated, to Army Engineer Corps specifications, by Hines. For this big job, demanding clock-like coordination in lumber supply and manufacturing operations, two production lines in the Edward Hines Lumber Co. Wood Fabrication Plant in Chicago gear Hines "know-how", facilities and equipment to the output of the Caterpillar Tractor Co. in Peoria. The resulting saving in time, effort and money is an outstanding example of Hines' service in expediting the safe delivery of vital equipment to our armed forces all over the world.

SOUTH SEAS "PREFAB" HOUSE

We're told that after Hines export boxes complete their job of delivering Caterpillar tractors safely, they provide shelter for fighting men . . . a fitting end-use for good lumber!



. . . and Fit to Fight!

BOXES FOR TORPEDOES . . . .

Among the many special protective containers, engineered and produced by Hines to meet exacting specifications, were boxes to insure the safe delivery of the delicate propulsion machinery for torpedoes. If you have a production or design problem in wood, get in touch with Hines—we can help you with every phase of the job.

EDWARD HINES LUMBER CO.

CHICAGO, ILLINOIS • ESTABLISHED 1892

PROOF OF SUPERIORITY
IN FINDINGS OF NATION'S TOP TESTING AUTHORITY

1. POZZOLITH INCREASED DURABILITY

FRESH WATER — In Laboratory — Freezing and Thawing

Nominal Cement Factor—Sacks		No Cycles	Durability Factor	Change in Dynamic E
4½ Plain Concrete	0 Specimens went	200		
	26 " averaged	49	17	-31
4½ Pozzolith Concrete	6 Specimens went	200	100	-1
	5 " "	200	80-95	-16
	26 " averaged	139	63	-21
6 Plain Concrete	0 Specimens went	200		
	26 " averaged	50	20	-32
6 Pozzolith Concrete	14 Specimens went	200	100	+3
	2 " "	200	95	-4
	26 " averaged	176	80	-10

SEA WATER — after 142 Cycles of Outdoor Freezing and Thawing

6 *Plain Concrete* — of 39 beams tested ..... 15 survived
6 *Pozzolith* " — " 77 " " ..... 76 survived

2. Pozzolith increased STRENGTH ★

	3 day Compressive	28 day Compressive
6 Sack Concrete	50%	12%
4½ " "	70%	25%

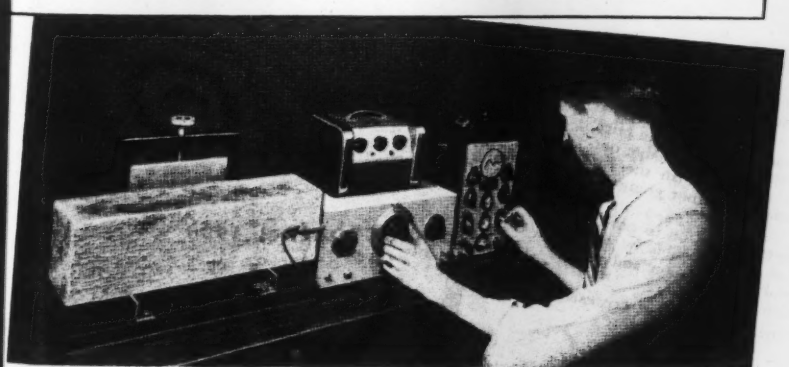
3. Pozzolith cut BLEEDING ★

6 Sack Concrete	55%
4½ " "	60%

4. Pozzolith cut WATER-CEMENT Ratio ★

6 Sack Concrete	14%
4½ " "	15%

★ As compared to untreated concrete of same slump and cement content



Through the use of high frequency vibrations, this Sonic Apparatus tests concrete beams for failure due to alternate freezing and thawing.

EXTENDING over a two year period and involving over 800 concrete specimens made with typical cements, these tests conducted by the Nation's highest authority establish not only the *greatly superior durability* of Pozzolith concrete, but again confirm that Pozzolith *increases strength and cuts bleeding* because it lowers water-cement ratio 14-15%.

An outstanding advantage of Pozzolith is the fact that it *assures uniform results under job working conditions.*

That Pozzolith and *cement dispersion* mark a new era of concrete performance is confirmed by millions of yards of Pozzolith concrete in all types of structures.

Write and one of our field engineers will be glad to call and discuss the advantages of Pozzolith for your jobs.

THE MASTER BUILDERS CO., LTD.
TORONTO • MONTREAL

In the U. S. A.
THE MASTER BUILDERS CO.
CLEVELAND 3, OHIO

The Trend Is Toward • • •

POZZOLITH
CEMENT DISPERSION

OCTOBER 2, 1941

WE RENEW OUR PLEDGE

Two years ago, at the beginning of the present war with its uncertainties and threats to the future of all industry, this Company publicly pledged itself not to increase its selling prices.

On this, the second anniversary, we again publicly renew that pledge.

During the last two years we have not only kept the pledge previously made, but *we have actually reduced our selling prices by more than 6%* because of more efficient operation made possible by the marvelous cooperation and ability of our organization. This was accomplished in the face of rising labor and material costs, both of which have been increased by considerable amounts.

It is our belief that the only hope for the continuance of the present industrial system now threatened from within and without is in its ability to give more and more to the consumer for less and less of his dollar. This is the strength of American individual initiative. This is the hope of our country's future. If American industry can accomplish this universally, we need not fear dictators either at home or abroad.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio
October 2, 1941

J. F. Lincoln
President

STATEMENT OF POLICY

The world is entering a crisis, the result of which no one can foresee. Other wars have brought inflation, followed by unemployment and depression after peace was achieved. America's experience in the World War illustrates this fact.

Much of this post-war trouble would have been eliminated by a more foresighted price policy on the part of manufacturers and distributors. Price inflation by the seller when he had a dominant position resulted inevitably in reaction with deflation, depression and suffering. Many of those price increases were not warranted.

Before such an inflationary cycle of prices is again started, we publicly pledge ourselves, as far as possible, to maintain present prices.

Further, if the materials we buy are increased in price, or the cost of labor is increased, then we pledge ourselves to raise selling prices no more than the bare increase in cost of raw materials and labor going into our products.

Further, we pledge ourselves to pass on to our customers the reduction in cost made possible by better manufacturing methods, wider distribution and technical advances in production.

THE LINCOLN ELECTRIC COMPANY

Cleveland, Ohio
October 2, 1939

J. F. Lincoln
President

OCTOBER 2, 1939

★ ★ OUR PLEDGE MAINTAINED ★ ★

On October 2, 1939, we announced the policy of "no increase in selling prices". A progress report made October 2, 1941, showed we actually had reduced prices by more than 6% during the period 1939 to 1941.

We have adhered to this policy of price reduction throughout the war years. Despite general increases in the costs of labor, materials and distribution . . . and despite governmental regulations . . . we have been able to maintain or reduce our prices throughout the entire period from 1939 to date.

This has been made possible by our incentive system . . . a method which, if it had been applied throughout industry, would have doubled America's output of war goods for a quicker Victory and would have cut the cost of the war by 50%.

America's future depends largely upon her *efficiency of production.* Our proved incentive system has in it the seeds of a satisfactory answer to the difficulties of this nature in industry.

THE LINCOLN ELECTRIC COMPANY

Cleveland 1, Ohio
May 7, 1945
Victory in Europe

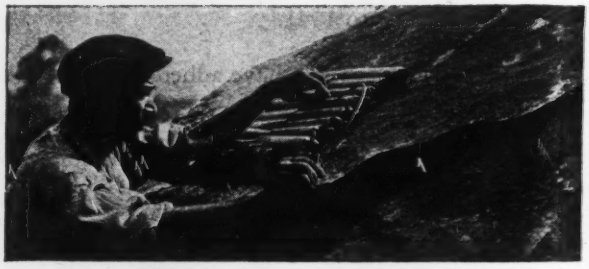
J. F. Lincoln
President

Easy way to break up big ones...

HI-VELOCITY GELATIN saves labor, money and time

1. Du Pont research scores again by giving you a new method of secondary blasting. With Du Pont "Hi-Velocity" Gelatin dynamite it is not necessary either to remove the explosive from the wrapper or to confine the charge with mud.

2. A charge of Du Pont "Hi-Velocity" Gelatin is placed on the boulder above. Because this powerful dynamite always detonates at its highest velocity, less is required, saving from ¼ to ½ the amount of explosives normally used for secondary blasting.



3. Blasting cap and fuse are attached to the primer. Cartridges weigh a pound each, so that the required charge can be measured readily. No handling of the raw dynamite is necessary.

√ CHECK THESE FEATURES OF "HI-VELOCITY" GELATIN:

1. **DEPENDABLE.** "Hi-Velocity" Gelatin always detonates at its top velocity.
2. **ECONOMICAL.** Saves labor . . . reduces explosives cost.
3. **CONVENIENT.** Easy to handle . . . easy to measure. Available in cartridges of 1¾" x 8" weighing 1 lb., also 3" by 5 lbs.; 4" by 10 lbs.; 5" by 25 lbs.

4. Result of the blast . . . the strong, shattering action of "Hi-Velocity" Gelatin has broken the big boulder into pieces that can easily be moved. Labor, money and time have been saved.

Ask your Du Pont Explosives representative about this simple and economical method of secondary blasting. He'll be glad to give you full details. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

MARION
HAS THE ANSWER!
What Is Your Material Handling Problem?
Construction will benefit materially from the billions of dollars now being set aside for postwar developments.
To meet the demand that will exist for proven equipment, MARION has a machine of the right size and type from ¾ cubic yard to 35 cubic yards.
Put a fast, powerful MARION on that postwar job—then watch the rock and dirt fly!
Let's discuss your problems!
THE MARION STEAM SHOVEL CO. • MARION, OHIO
SHOVELS • DRAGLINES • CRANES • PULL-SHOVELS
CLAMSHELLS • WALKERS • from ¾ cu. yd. to 35 cu. yds.
IS IT GENERAL CONSTRUCTION?
There is a modern, fast, powerful, time-proven MARION of the right size and capacity to make short work of any construction job, big or small. Tell us your problem.
MODERNIZE WITH
THE MARION STEAM SHOVEL COMPANY
Marion, Ohio
3/4 CU. YD. TO 35 CU. YDS.

BIG *all the way through*

When you see the *new* Ward LaFrance commercial models, you'll be looking at something new in transportation . . . the toughest, sturdiest job on the highway. It's the "civilian" version of the great M1A1 Heavy Wrecker we have been turning out in volume for the Army, developed to be the last word in rugged truck performance . . . The new Ward LaFrance heavy-duty trucks are "built big" not only in rated capacity, but all the way through.

. . . If your fleet suffers from the usual profit-eating toll of axle failures, broken springs, burned clutches, the new Ward LaFrance is the common-sense answer to more dependable, lower-cost hauling. This stamina comes from a basic engineering principle of providing strength, more than sufficient for your requirements. Ward LaFrance has evolved a sales plan of unusual interest, which you should investigate. Write to our Sales Department today for details.

GAI

WARD LAFRANCE

TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC., ELMIRA, NEW YORK

DIAMOND DRILLING

Speeded up TIME

with WEAR-RESISTING JKS CORE BITS

IN the early stages of surveying and planning . . . through long weeks of drilling and grouting . . . in the final stages when test drilling is the climax of a big job — *time* is vital.

JKS core bits give faster service because two different types permit selection of a metal matrix particularly suited to the earth or rock formation to be drilled.

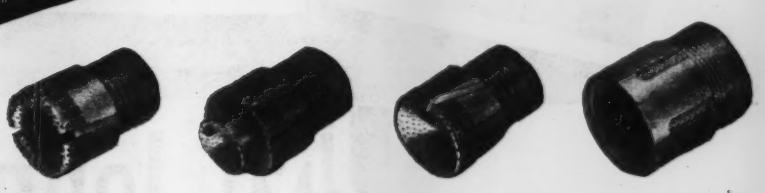
Faster action can be obtained in coarse-grained, rough, irregular formations by using the JKS HARDHED bit. The free cutting action of its powdered metal matrix, in which the diamonds are sintered, allows a greater drilling speed than is normally possible with powdered matrices.

Faster drilling in hard, fine grained ground is possible by use of the JKS HI-CASTE bit. The "Vankolite" matrix of relatively hard metal, wears away gradually, leaving the diamonds free for rapid cutting action.

Speed up with HARDHED bits in rough, irregular formations, with HI-CASTE bits in hard, fine grained ground.

J. K. SMIT & SONS, Inc.

157 Chambers St., New York 7, N.Y. 6400 Tireman Ave., Detroit 4, Mich.



HI-CASTE DIAMOND CORE BITS • CASING BITS • CONCAVE BITS • PILOT BITS • REAMING SHELLS HARDHED

Wherever planning

JOHNS-MANVILLE

JM PRODUCTS

Johns-Manville

committees meet...

The *swing* is to TRANSITE PIPE

for efficient, economical Water Transportation

FOR the same good reason that Transite Pipe has been chosen for service in thousands of American communities in the past . . . this asbestos-cement pipe is now getting the call on many of the water-works projects planned for tomorrow.

That reason is: efficient, economical water transportation—proved through the years.

If you are planning an improvement program for the days ahead, it will pay you to look into these money-saving advantages of Transite Pipe:

High Flow Capacity. Because Transite is non-metallic, tuberculating waters can never reduce its initial high flow rate (C=140). This often permits use of smaller diameter pipe . . . and ends problems arising from progressive reduction of carrying capacity due to tuberculation.

High Corrosion Resistance. And that means outside, inside and all the way through . . . proved by installations in virtually all types of soils, under a wide range of service conditions.

Low Installation Costs. Light in weight, Transite Pipe requires fewer men for handling, smaller installation crews. Mechanical handling equipment is not needed except for the larger sizes.

Rapid Assembly. The Simplex Coupling provides tight, flexible joints . . . permits quick, easy assembly even with inexperienced crews. And, joints stay tight even when the line is deflected as much as 5° at each coupling.

* * *

For detailed information about these and other advantages of Transite Pipe as a water carrier, send for illustrated brochure TR-11A. Address Johns-Manville, 22 E. 40th St., New York 16, N.Y.

Asbestos TRANSITE PIPE

Why FREIGHT ELEVATORS are important!

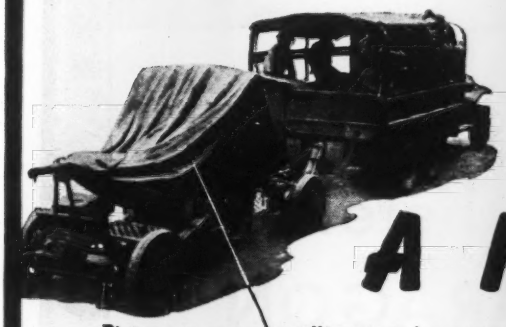
BEHIND this busy scene, freight elevators are constantly on the job . . . keeping supplies and even the trucks themselves moving on schedule . . . without bottlenecks . . . without confusion.

For intensive service, the elevators should be high speed, automatic in operation and provided with power operated doors. Such equipment will compensate for some of the time lost in loading and unloading operations.

If conditions require, freight elevators can be dispatched to predetermined floors to suit any cycle of operation. Also, they do not necessarily require regular attendants.

Your nearest Otis representative is now available to assist you and your Architect in making preliminary elevator plans and studies. For the finest in vertical transportation tomorrow, call your Otis representative TODAY!

Otis ELEVATOR COMPANY
OFFICES IN ALL PRINCIPAL CITIES



The War Showed the World A NEW CANVAS

Picture a more gruelling test for cotton duck, first cousin to gun cotton in burning qualities; subject to the same natural deterioration as any organic matter in the elements; victim of the virile mildew fungus.

Yet that same cotton duck has gone to war. Resisted every incendiary that the enemy could throw over; every deteriorating influence that the swamps of Guadalcanal, the deserts of North Africa, the bleak winds of Iceland and Russia, and the salt spray and tropical heat and rains of the South Pacific could muster.

But, of course, that cotton duck was FIRE CHIEF-treated Canvas — the original fire-, water-, weather- and mildew-resistant HOOPERWOOD "Engineered Canvas."

What does this triumph of "Canvas Engineering" hold for the post-war world? Many things, among which are: construction windbreaks that hot rivets or welding torches won't ignite . . . awnings that won't burn, mildew and rot . . . truck covers outlasting their predecessors several times over . . . ships' hatch covers and lifeboat covers that present no fire hazard . . . and many other superior canvas products.

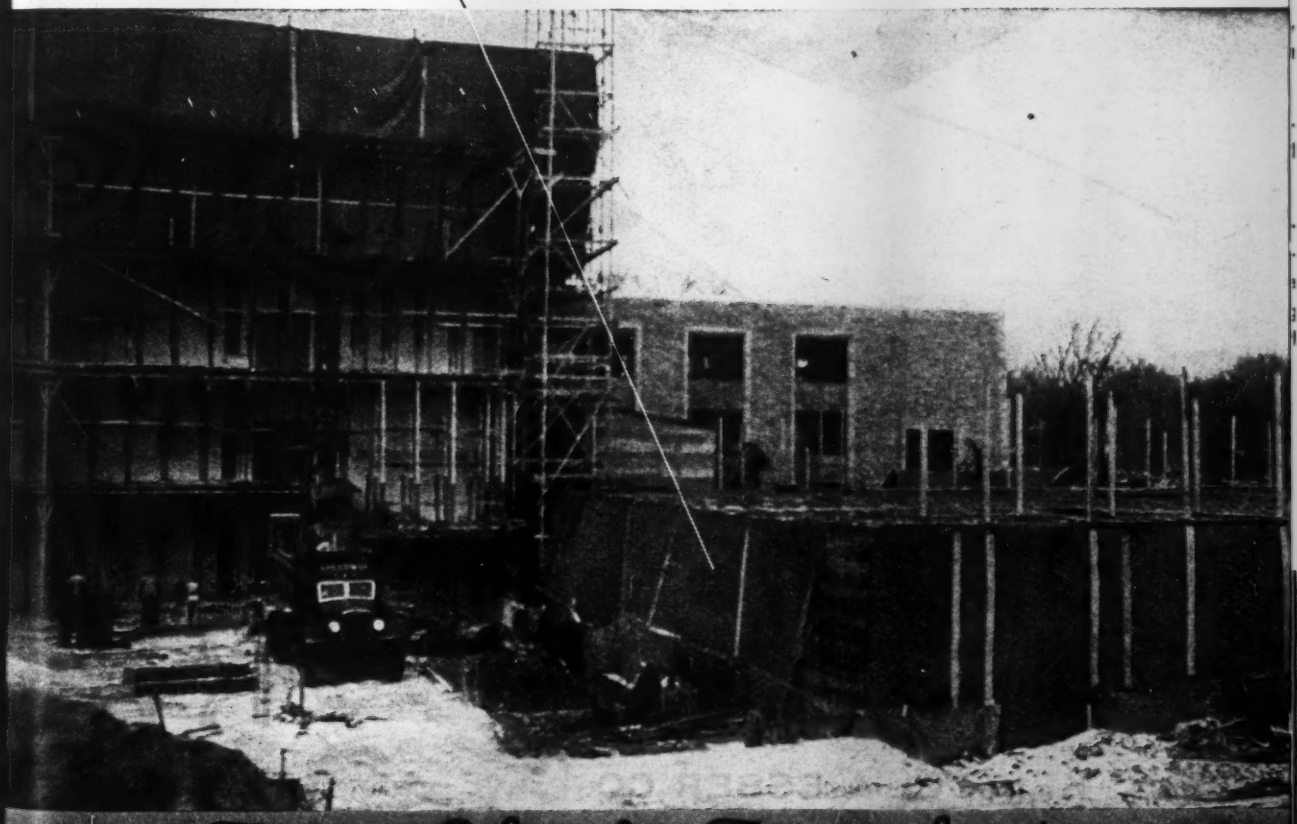
If you are interested, write for new bulletin, "War Proved for Post-War Service."

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: WOODBERRY, BALTIMORE, MD.

Since 1800 (through six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope, Sash Cord.



Fire-Chief Finished

HOOPERWOOD COTTON DUCK

Put your hand here!

PARAGON

REG. U. S. PAT. OFF.

DRAFTING MACHINE

HANDLING is believing. Get the finger tips of your left hand on the control ring of a PARAGON Drafting Machine. The lightest pressure is all you need to set the scales at the angle you want, anywhere on the drawing board. Your right hand is always free. For the full story of PARAGON features, convenience and handsome modern appearance, write on your letterhead to Keuffel & Esser Co., Hoboken, N. J.

KEUFFEL & ESSER CO.

EST. 1867

K+E

Drafting, Reproduction, Surveying Equipment and Materials. Slide Rules. Measuring Tapes.

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Fort Pitt Bridge

...builders and erectors of fabricated steel structures

Look to the Fort Pitt Bridge organization for America's prize winning bridges—combining beauty, *advanced-engineering*, dependability—with half-a-century of progressive, structural steel fabricating experience.

Aggressive communities everywhere are now planning peacetime improvements, many of which will involve the use of structural steel. Fort Pitt Bridge can help you get these plans in the *action* stage, ready for instant use—with Victory.

Built for the State of Ohio, awarded First Place, Class B, by the A.I.S.C. as the most beautiful bridge of its class built during

FORT PITT BRIDGE WORKS

General Offices, Pittsburgh, Pa. . . . Plant at Canonsburg, Pa.

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NEW YORK, N. Y. . . . . 441 Lexington Avenue
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DETROIT, MICHIGAN . . . . . New Center Building
PHILADELPHIA, PA. . . . . Commercial Trust Building

AN IMPORTANT ENGINEERING ADVANCEMENT

Ford Announces

NEW DEVELOPMENTS in the Heavy Duty 100 H.P.

FORD V-8 TRUCK ENGINE

Ford

Here's Good News
FOR TRUCK OPERATORS

The Model 59 engine is now offered as original equipment only. It will eventually be made available as a service replacement in Ford Trucks and Commercial units already on the road.

Here are some of the important improvements in this engine:

NEW long-life Tri-Alloy connecting rod bearings . . . **NEW** aluminum alloy pistons with four rings for oil economy . . . **NEW** larger capacity oil pump with more screen area for improved lubrication . . . **NEW** crankshaft rear bearing oil seal . . . **NEW** rust-proofed valve springs . . . **IMPROVED** cooling of valve seats . . . **NEW** flat-type waterproof distributor with full automatic advance and vacuum control . . . **NEW** high efficiency fan . . . **IMPROVED** carburetion . . . **IMPROVED** intake manifold for easy vacuum pipe connections . . . **SIMPLIFIED** design provides easier accessibility for service . . . clutch can be replaced without removing oil pan . . . more parts are interchangeable, reducing the number of service items required.

IT'S HERE—the first of wartime truck engineering developments by Ford to be made available to civilian operators.

An improved Heavy-Duty, 100 H.P. V-8 Engine now powers Ford Trucks and Commercial units which are in limited production for civilian priority holders.

This great power plant is the Model 59. You'll be hearing a lot about its fine qualities. It includes many of the Ford Truck engineering advancements made in response to military needs which are proving valuable in civilian trucking.

These improvements, affecting virtually every operating part of the engine, raise Ford Truck engine performance to new high levels of stamina, economy and efficiency—with new and important *service* benefits of interest to every truck owner and maintenance man.

Read about them in the text at the left.

FORD MOTOR COMPANY

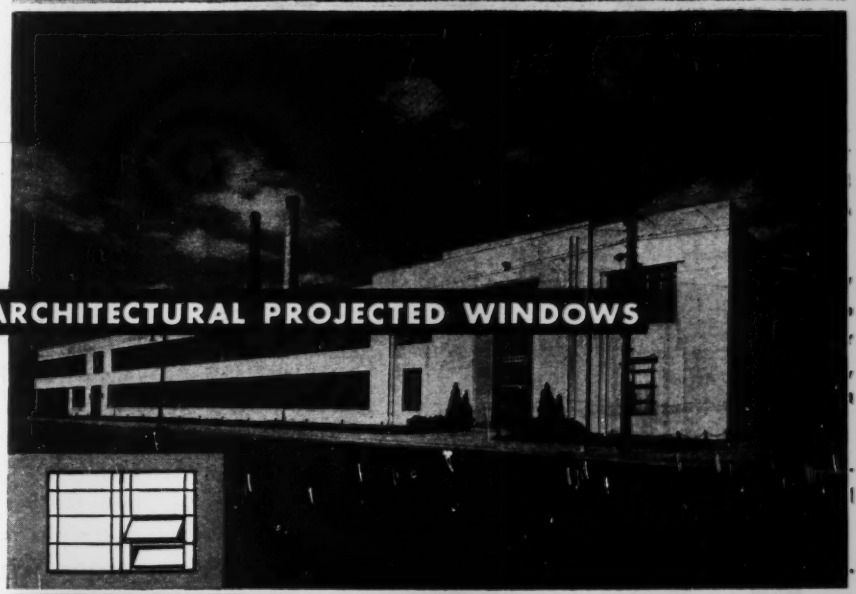
HATS OFF DEPARTMENT

CECO INTERMEDIATE CASEMENTS

HATS OFF TO . . .

Harry A. Thomsen, Architect
Dinwiddi Construction Co.,
Contractor for the Spreckels Sugar Co.
Building, Woodland, California.

An interesting example in which a California Architect combines plant and office building into one unified structure. Here Ceco steel windows are used to excellent advantage in both office building and plant. Ceco furnished intermediate casements, fixed sidewall, pivoted sidewall, mechanical operators, screens and commercial projected steel windows.



CECO ARCHITECTURAL PROJECTED WINDOWS

HATS OFF TO . . .

Alfred S. Alschuler
Architect and Contractor
for the Pheoll Manufacturing Co.
Building, Chicago, Ill.

Here you find a fine treatment of entrance with long continuous steel windows serving both manufacturing space on first floor and office space on second floor. A nice solution to the problem of resolving various units into a dignified pleasing facade. Ceco furnished pivoted sidewall, fixed sidewall, and architectural projected windows.

CECO COMMERCIAL PROJECTED WINDOWS

HATS OFF TO . . .

Joseph W. Radotinsky, Architect
Universal Construction Co., Contractors
for the Argentine High School Addition,
Kansas City, Missouri.

The use of continuous steel windows give maximum lighting for classrooms harmonious with the modern treatment of the entrance. In this high school you can see that lines of continuous steel windows are particularly applicable to school room use. Ceco furnished commercial projected windows, with the vertical muntins omitted.

CECO STEEL PRODUCTS CORPORATION
MANUFACTURING DIVISION
5701 WEST 26th STREET, CHICAGO, ILL.
Concrete Engineering Division, Sheet Steel and Wire Division, Highway Products Division

NGINEERING MAKES THE BIG DIFFERENCE IN CECO CONSTRUCTION PRODUCTS

GET Extra Wear IN CONCRETE FLOORS

FOR heavy-duty concrete floors, use 'Incor' 24-Hour Cement and sound aggregates in a **DRY MIX**, to avoid segregation. Compact and finish carefully, **THEN CURE THOROUGHLY** —too little curing defeats all the good work that goes before. For curing insurance, always use 'Incor'. Kept wet **ONLY ONE DAY**, 'Incor' concrete is as strong, dense and wear-resistant as ordinary concrete cured 6 to 8 days. **NEXT-TO-AUTOMATIC CURING** with 'Incor' assures—

GREATER DURABILITY—EXTRA WEAR
—floors that won't dust under hardest use

NO BUSINESS TIE-UP
—new floors for old over a weekend

FAST RECONVERSION
—place concrete today, use it tomorrow

Use 'Incor'* 24-Hour Cement for floors, both new work and repairs—and for dependable overnight service strength to speed reconversion. Write for "Heavy-Duty Floor" book.

*Reg. U. S. Pat. Off.

THREE QUALITY CEMENTS

LONE STAR PORTLAND CEMENT
for concrete of outstanding quality in all types of construction

'INCOR' 24-HOUR CEMENT
America's FIRST high early Portland Cement —saves time, cuts costs

LONE STAR MASONRY CEMENT
The modern masonry cement, for really great job performance

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY, MO. • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25-MILLION BARRELS ANNUAL CAPACITY

True directional steering of Wooldridge Terra Cobra, high-speed, self-propelled Earthmovers is unique in the field of two-wheeled units. At no time is one wheel required to pull the entire load, even on sharp turns or in soft earth. This results in less strain and wear on equipment and operators, insuring higher hourly averages throughout each daily shift. In a Wooldridge Terra-Cobra positive steering control is combined with positive two wheel power and speed at all times. Investigate fully. Get the full details.

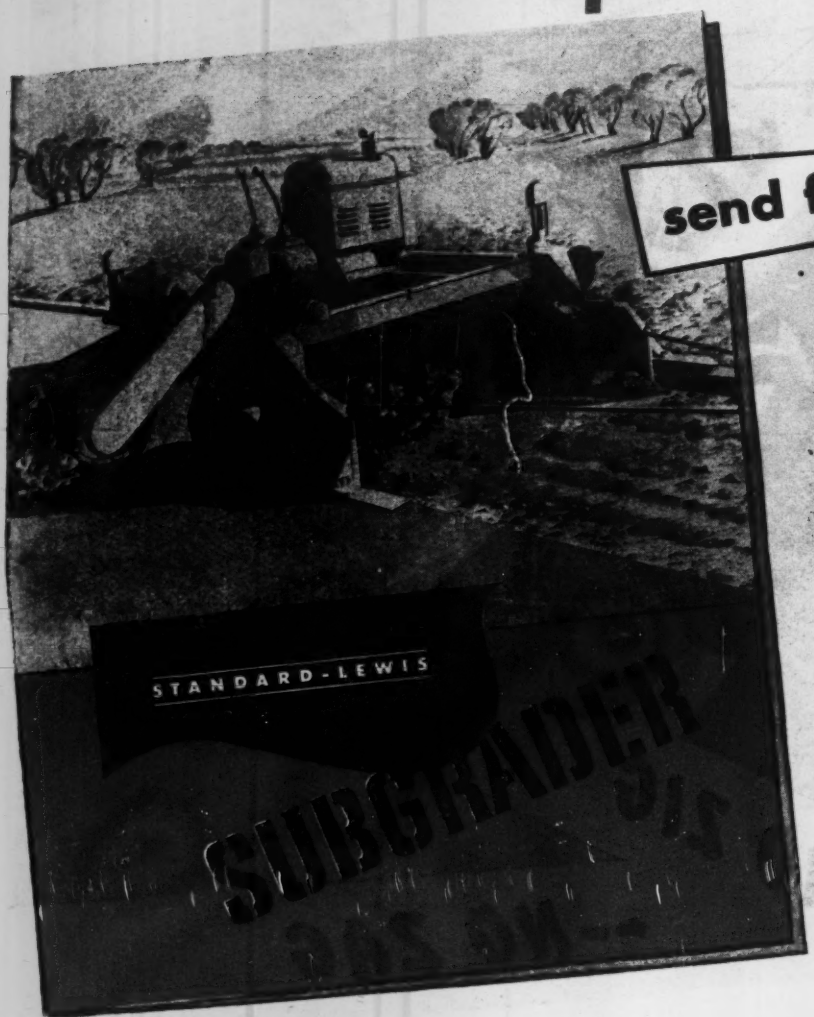
WITH POWER MAINTAINED ON BOTH WHEELS AT ALL TIMES

WRITE TODAY *for twelve-page Bulletin No. TA-425.— And if you are also interested in Heavy-duty scrapers or other earth-moving equipment, ask for Bulletin No. W-210.*

WOOLDRIDGE MANUFACTURING CO.
SUNNYVALE • CALIFORNIA

WOOLDRIDGE
TERRA COBRA
SELF-PROPELLED EARTHMOVERS

For Complete Facts

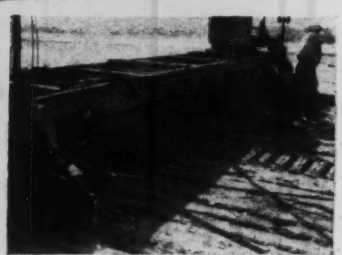


send for this folder

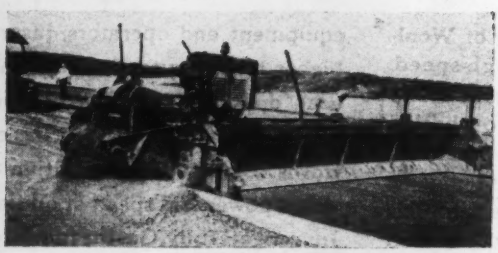
The many unique features embodied in the new Standard-Lewis Subgrader come as a result of design by practical paving equipment engineers. These men know well the problems encountered and have built into this machine many practical improvements that save contractors, time, labor and money.

The new Standard Steel 8-page folder covers in detail all information relating to the efficient operation and economy provided by this ingenious Subgrader.

A request on your letterhead will bring a copy promptly.



This is an example of deep cutting into tough material—gravel as large as 14" in diameter is handled with ease.



No chipped or broken edges of concrete pavement is experienced with the solid rubber tired wheels you can use on the STANDARD-LEWIS Subgrader.

OTHER STANDARD PRODUCTS

ASPHALT AND CONCRETE FINISHERS
TANDEM ROLLERS
TOW BROOMS
BINS AND BATCHERS
CONCRETE SPREADERS

STANDARD STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

FOR CONSTANT FULL FLOWING AND LIFELONG SERVICE!

● Copper Service Pipe connected with STREAMLINE SOLDER FITTINGS has been installed in hundreds of communities throughout the United States and Canada, from corporation to curb stop and on into the building. It has been providing peak service for many years and will for many years to come. STREAMLINE Copper Pipe and Solder Fittings combine the non-corrosive qualities of copper and bronze with the most modern and reliable method of water service installation on the market.

Rustable piping, which has been in service for a number of years, may outwardly still appear to be in fair condition, but it is almost a certainty that the walls of the pipe, in many places, have been so reduced by corrosion, that it is only a matter of time until failure occurs. More than that, the conducting area of the pipe has, in the great majority of cases, been greatly reduced by the accumulation of slime and corrosion.

An installation of STREAMLINE Copper Pipe and Fittings insures a constant full-flow of water from main to building. With the possible exception of abnormal earth or water conditions, it will last for generations.

Many municipalities throughout the country are now making plans for improvements or additions in their water systems as soon as Copper Pipe is again available. STREAMLINE Copper Service Pipe is the ideal material for water service lines and for many applications in filtration plants; in aeration lines and in heating coils using the sludge digestion system in sewage disposal plants—and, of course, for all general heating and piping purposes.

STREAMLINE
PIPE AND FITTINGS DIVISION
MUELLER BRASS CO.
PORT HURON, MICHIGAN

STREAMLINE

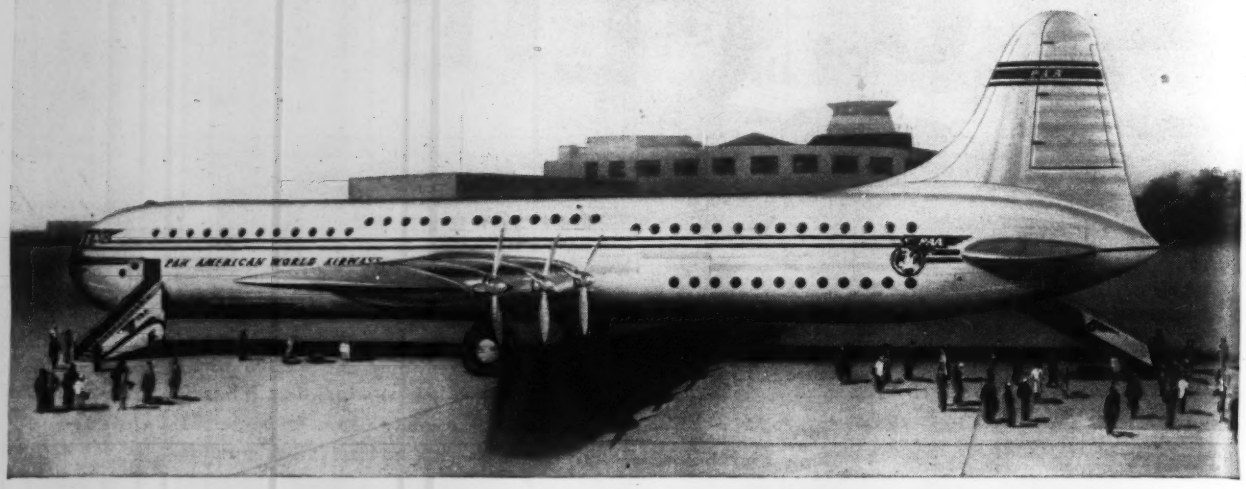
TRADE MARK REG. U. S. PAT. OFFICE

COPPER PIPE AND FITTINGS

What a Plane!

204 passengers — 320,000 pounds — 310 m.p.h.— 4,200 mile range — 230 ft. wing spread

Fleets of these and other globe circling titans will soon be landing at principal municipal airports throughout the country.



Future Air Giant Challenges Airport Builders—

Concrete meets the challenge!

When this titan lands it will concentrate on each of its two principal axles, a load of 155,000 pounds. It will be twelve times the size of present twin-engined commercial aircraft.

But the concrete runways of New York's Idlewild and other proposed modern airports will be able to carry this colossus in safety. And such heavy-duty runways actually cost less to build than any other pavement with equal load-carrying capacity.

In addition to this low first cost, portland cement concrete has low maintenance expense and long life under heavy service. Thus *low annual cost is assured*—the true measure of economy.

Pan American says, that with proper design and construction, it appreciates the excellent visibility of concrete, its high skid resistance, rapid drainage, low tractive resistance and freedom from loose particles which may injure personnel and plane.

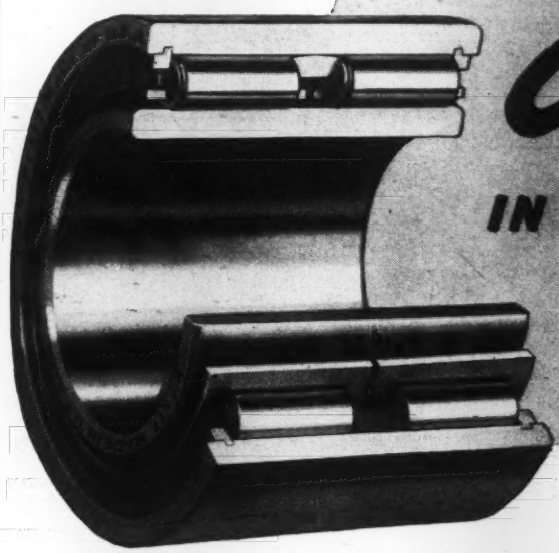
Our engineers, working on hundreds of airports, have acquired valuable experience. Their assistance in designing pavements to carry any anticipated wheel loads is available without obligation to engineers now planning construction of airport facilities.

BUY MORE WAR BONDS • KEEP THE WAR BONDS YOU BUY

PORTLAND CEMENT ASSOCIATION

Dept. A6d-17, 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work



FOR GREATER CAPACITY IN THE SAME HOUSING BORE

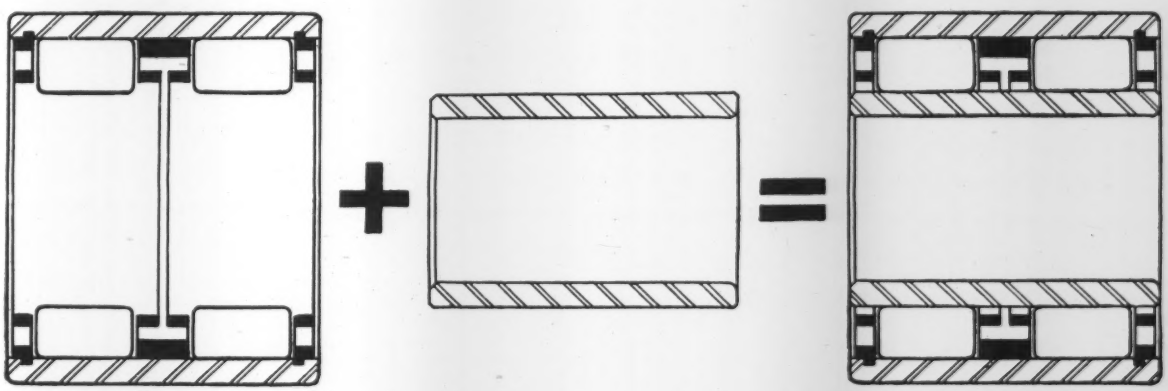
BEARINGS: HYATT

In the light series we provide a roller bearing of the same high precision as others in the Hy-Load range but in addition twice the load capacity of single row bearings of the same shaft diameter. It's the A-6200-TS "Duplex" type bearing with double roller assembly.

The component parts of this bearing are freely interchangeable. That is any inner race will fit any roller assembly of the same piece number—thus facilitating product assembly and disassembly. This bearing like the other separable inner race bearings in the Hyatt Hy-Load line can be used with the inner race omitted and the rollers operated directly on a hardened and ground shaft.

Look into the Hyatt Hy-Load bearing application advantages—three types—separable inner and outer race—self-contained—and the double roller assembly.

Bulletin covering all types upon request.

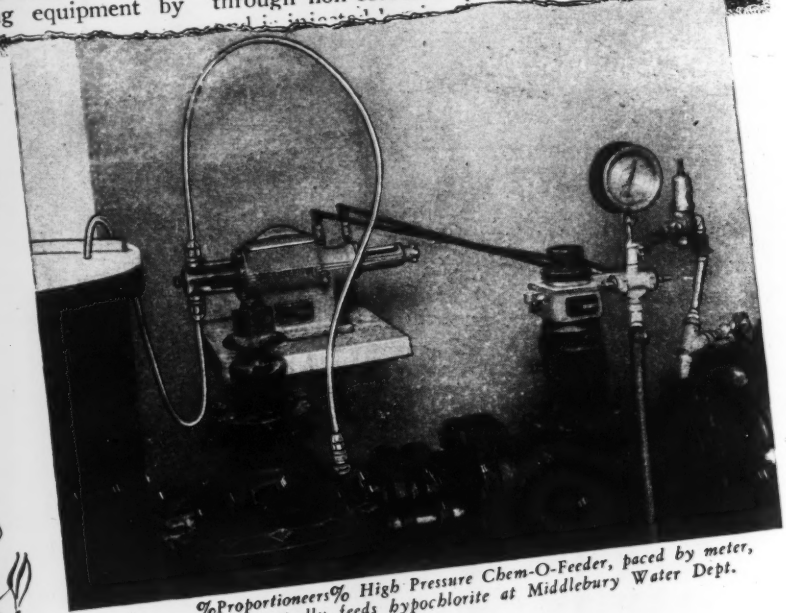


HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION

Harrison, New Jersey · Chicago · Detroit · Pittsburgh · Oakland, California

% PROPORTIONEERS % SOLVE CHEMICAL FEEDING PROBLEM

How to automatically treat the town water supply was a serious problem in Middlebury, Vt. But the Middlebury Water Commissioners made a wise choice . . . they called in the Johnson-Barker-Webb Co. of Nashua, N. H., representing %Proportioneers% in Vermont and N. H. Automatic flow proportional feeding equipment by %Proportioneers% was soon installed, giving complete satisfaction and 100% protection to the town water supply. A small frost-proof cellar houses the entire chemical feeding equipment, together with the main valves and meter. Chemical solution is drawn from the reagent tank through non-corrosive plastic tubing



%Proportioneers% High Pressure Chem-O-Feeder, paced by meter, automatically feeds hypochlorite at Middlebury Water Dept.

End your water treating problem with %Proportioneers% Chemical Feeders and Hypochlorinators . . . treat your water supplies automatically! The High Pressure Chem-O-Feeder, shown above, starts, varies and stops dosage of chemical as the water comes on, fluctuates and tapers off. The meter control prevents dangerous undertreatment or unpleasant taste resulting from wasteful overtreatment. Hydraulic operation of Chem-O-Feeder insures unfailing operation, without the use of electricity or other power source.

%Proportioneers% High Pressure Chem-O-Feeder injects against line pressures up to 200 lbs. per sq. in. and is equipped with "See-Thru" plastic pump head which clearly shows operation of plunger and check valves. A "fluid sealed yoke" keeps air from reaching packing gland, thus preventing build-up on plunger, cutting of packing and subsequent packing failure.

Other %Proportioneers% are available to meet every operating condition. Information on request.

% PROPORTIONEERS, INC. %

92 Codding St., Providence 1, R. I.

INTRODUCING A NEW DESIGN PARTNER

"National Design Specification", a new convenience volume, joins with TECO DESIGN MANUAL to conserve your time . . . effort!

You can now throw "rule of thumb" design data for timber out the drafting room window and save time locating widely separated information you need for engineering in timber.

The new . . . *National Design Standard for Stress-Grade Lumber and Its Fastenings* . . . gives you just what you need quickly and in the form in which you can use it. It collects the most useful body of modern, scientific, tested, design information on timber and its fastenings.

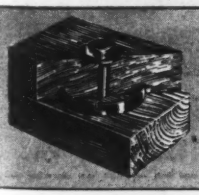
Recommended by the National Lumber Manufacturers Association as a technically sound national standard for lumber design practice, it correlates in a single volume the miscellaneous references you need. Used in combination with the *Teco Design Manual*, the two books provide the basic foundation for your . . . How-To-Design-It-In-Timber Library.

The *Specification's* data is divided into the following classifications . . . general provisions; allowable unit stresses for stress-grade lumber; design loads; design formulas for beams, columns, trusses, etc.; timber connector joints, bolted joints, lag screw joints, nail, spike, drift pin, and wood screw joints; and glued laminated structural members.

Use the COUPON NOW to get both of these books . . . they are free.

Timber Engineering Co., Inc. of Washington, D.C.

Washington • Minneapolis • San Francisco • New Orleans • New York



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SPLIT RINGS • SHEAR PLATES
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Timber Engineering Company
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Please send me without charge the new . . . NATIONAL DESIGN STANDARD FOR STRESS-GRADE LUMBER AND ITS FASTENINGS.

I would also like a copy of TECO DESIGN MANUAL (Check.....).

Name.....

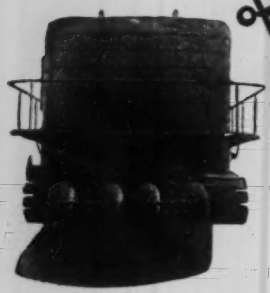
Firm.....

Business.....

Address.....

City..... State.....

A Thoroughly Proven Type



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ROGERS HEAVY DUTY TRAILERS

gains wider acceptance

MANY riggers and contractors are solving low headroom problems with this distinctive Rogers Girder Type Trailer.

Road clearance is reduced to a minimum—loading and unloading are simplified—and loads move under bridges and low obstructions that would otherwise necessitate long detours and costly delays.

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EXPERIENCE PERFORMANCE

MITCO
OPEN STEEL FLOORING

Pressure Formed
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Easy to Install
Hendrick Manufacturing Company
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OHIO
LOCOMOTIVE CRANES

30 to 50 TON CAPACITY

DIESEL · ELECTRIC · GASOLINE · STEAM

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BAILEY METERS AND CONTROLLERS

FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1029 IVANHOE ROAD • CLEVELAND, O.
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Wood Preservers Since 1878
All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or

DU PONT CZC Chromated Zinc Chloride

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POLES, CROSS ARMS, PILING, TIES
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New Construction—Repairs

Prestressed Tanks	Steel Encasements
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Disintegrated Concrete Abutments Renewed	
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THERE'S ONLY ONE ELECTROFORGED STEEL GRATING
BLAW-KNOX
★ Easy to maintain—paint reaches entire surface.
★ Open to maximum area of light and air.
★ Self-cleaning—no sharp corners to clog with dirt.
★ Economical and easy to install.

BLAW-KNOX DIVISION of Blaw-Knox Company, 2001 FARMERS BANK BLDG., PITTSBURGH, PA.

ELLIOTT'S
VEMCO
Drafting Machine
Speeds Up Operations 40%

Accurate and Faster

Vemco Drafting Machines will enable you to get more production from your drafting room without adding to the personnel or sacrificing accuracy. Vemco machines operate smoothly, easily and with precision, eliminating many drafting tools.

Write Dept. A-4 for full information.

B. K. ELLIOTT COMPANY
Drawing Materials Surveying Instruments
PITTSBURGH • DETROIT • CLEVELAND

STEAM TURBINES • HELICAL & WORM GEAR PUMPS
CENTRIFUGAL BLOWERS AND COMPRESSORS
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C. L. FIELDER CO.
ROANOKE, VIRGINIA
FABRICATORS and ERECTORS
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Specializing in
Industrial Buildings—Bridges —Steel Structures—Conveyors—Bins—Mine Structures—Misc. and Ornamental Iron Steel Plate Products.

PILE HAMMERS
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EXTRACTORS
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WHIRLERS
Write for descriptive catalog
McKIERNAN-TERRY CORP.
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DRILLING
ANYWHERE

We look into the earth

PENNSYLVANIA DRILLING COMPANY
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Dobbie Foundry & Machine Co.
Niagara Falls, N. Y.
DERRICKS • WINCHES • SHEAVES

BELMONT IRON WORKS
PHILADELPHIA ROYERSFORD EDDYSTONE
Fabricators *Contractors*
Exporters
STRUCTURAL STEEL
BUILDING & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING CHANNEL FLOOR
Main Office. Philadelphia, Pa.
44 Whitehall St. New York Office

QUICK REPAIRS ***RIGHT ON THE JOB***

Don't let breakdowns mean long lay ups! Repair-weld your equipment on the job. Do it in a few hours—save days required to obtain parts.

You can prolong the life of your equipment indefinitely—by building up and hard-surfacing with P&H Welding Electrodes. P&H welding engineers will be glad to help you as to the type to use and procedure to follow. The complete P&H line of welding electrodes includes a size and type for every requirement—for repair-welding; or for building up and hard-surfacing to provide unusual resistance to wear, impact and abrasion.

TODAY call your nearest P&H representative—he's ready to help you. Or if you wish, write us for complete-line booklet.

General Offices: 4404 West National Avenue, Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION
WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

Concrete by Pipe Line . . . gets it from here to there in
ONE OPERATION
CONCRETE BY PIPE LINE
GETS THERE FASTER . . .
MORE ECONOMICALLY . . . WITH
A MINIMUM OF PREPARATORY
WORK . . . ON THE MAJORITY OF
CONCRETE PLACING JOBS
A Frank Statement about Pipe Line Concrete
A NEWER AND BETTER METHOD BACKED BY 12 YEARS
OF DEVELOPMENT AND CONSTANT IMPROVEMENT
DID YOU KNOW . . .
YOU CAN
TRANSPORT,
ELEVATE
AND PLACE
CONCRETE IN
ONE OPERATION

This new booklet tells you how!

Write for your copy today. Find out for yourself how you can transport, elevate and place concrete in *one* operation . . . faster, more efficiently, at less cost . . . by *pumping* through pipe line.

You'll find page upon page of important questions and answers . . . pages of actual applications and results . . . mechanical data and general construction information . . . all accurately and carefully compiled to give you the most complete information possible on PUMPCRETE . . . the pump that *pumps concrete.* It's the newer and better method for *all* types of construction jobs.

This new booklet is ready for you now. Your copy will be mailed immediately. There is no cost or obligation. Address Chain Belt Company, Construction Division, 1633 West Bruce Street, Milwaukee 4, Wisconsin.

REX **CHAIN BELT COMPANY of Milwaukee**

CONSTRUCTION MACHINERY

OFFICIAL PROPOSALS
(Continued from page 172)

Bids: July 10 (407)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS
BUREAU OF CONTRACTS & ACCOUNTS
ALBANY, N. Y.

Sealed proposals will be received by Henry A. Cohen, Director, Bureau of Contracts & Accounts, 14th Floor, State Office Building, Albany, N. Y., until one o'clock p.m., eastern war time which is twelve o'clock noon, eastern standard time, on Tuesday, July 10, 1945, for the reconstruction of highway projects in the following Counties:

County	Deposit for plans	Bid deposit	Type	Miles	Priority rating
Albany & Rensselaer	$5	$1,800	Bit. Mac. M. M. Type 2, 42' Width	0.58	AA. 2
Chautauqua	5	2,000	Concrete Slab Bridge 30E		Ser. No. BR. 2-21
			Bit. Mac. M.M. Opt. 24' With	0.12	Rating AA. 3 Symbol F6
Chautauqua	5	2,500	Bit. Mac. M. M. Opt. 37'-62' Width	0.87	AA. 2
Onondaga	5	4,000	Bit. Mac. M. M. Opt. 44' Width	1.29	.....
Schenectady	5	4,500	Bit. Mac. M. M. Type 2 35'-60' Width	1.87	AA. 2
Seneca	5	9,000	Bit. Mac. M. M. Opt. 22' Width	5.47	AA. 2

Maps, plans and specifications, and estimates may be obtained at the office of the Department of Public Works, Bureau of Contracts & Accounts, Albany, N. Y., and at the office of the District Engineers in whose district the roads are located. The names and addresses of the District Engineers will be furnished on request and may be seen at the office of the State Department of Public Works, State Office Building, Room 898, Worth & Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by cash, draft or certified check payable to the order of "State of New York, Commissioner of Taxation & Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

Minimum Wage Rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Albany	$.85	$.85	$.85
Chautauqua	.85	.85	.85
Onondaga	.86¼	.86¼	.86¼
Rensselaer	.85	.85	.85
Schenectady	.85	.85	.85
Seneca	.80	.80	.80

UNLESS SHOWN OTHERWISE IN THE ITEMIZED PROPOSAL FOR EACH PROJECT.

The right is reserved to reject any or all bids.

CHAS. H. SELLS
SUPT OF PUBLIC WORKS

Bids: Aug. 1 (417)

Water Softening and Purification Plant

Sealed proposals or bids for furnishing materials for the enlargement of the Water Softening and Purification Plant of the Department of Water and Sewers of the City of Miami, Florida will be received at the office of the Director of the Department of Water and Sewers at 27 N.W. Second Street, Miami, Florida, until 3:00 p.m. Eastern War Time, the 1st day of August 1945.

OFFICIAL PROPOSALS

The bids will be opened publicly and read aloud at the above time and place designated.

The materials and equipment it is proposed to purchase under this contract involve

1. CO_2 Generating and Pumping Equipment and Air Blower, together with a Steam Plant to utilize the waste heat.
2. Clarifier Equipment.
3. Venturi Meter and Totalizer for the automatic control of lime feeders.
4. Sluice Gates.
5. 1972 Feet of B & S Cast Iron and 42 Tons of Fittings.
6. Chlorinators and Equipment for automatically controlling the chlorine dosage.
7. Parkway Cable and Submarine Cable.
8. Mechanical Equipment for mixing chemicals in the Mixing Tanks.
9. Sludge Pumps.
10. Equipment for the Remote Control of well pumps.
11. Equipment for mixing CO_2 with settled water.
12. Gate Valves.
13. Automatic pH Recorder and Automatic Control of CO_2 Application.
14. Lime Feeding, Slaking, and Pumping Equipment.
15. Pneumatic Chemical Conveyor.

Plans, Specifications, forms of Proposals, forms of Contracts, and forms of Surety Bonds may be examined at the office of George A. Weigand, Chief Engineer of the Department of Water and Sewers, 27 N.W. Second Street, Miami, Florida or may be obtained from his office for the sum of Ten Dollars ($10.00) in payment for each set. If within thirty (30) days after the ultimate time for the receipt of bids, the documents are returned undamaged, deposits of those who submit bids will be fully refunded, and other deposits, less the actual cost of reproduction of the drawings, will be refunded.

Each bid must be accompanied by a certified check, or approved Bid Bond, for not less than five per cent (5%) of the amount of the bid to insure execution of a contract to carry out the work in accordance with the Plans and Specifications and to insure the filing, at the making of such contract, of a bond with sureties satisfactory to the Water and Sewer Board of the City of Miami in the amount of the contract price, conditioned for the performance of the work in accordance with such contract. The certified checks or Bid Bonds of the unsuccessful bidders will be returned within five (5) days after the formal opening of the bids to all except the three (3) lowest bidders, and the remaining checks or Bid Bonds will be returned to the three lowest bidders within five (5) days after the Board and the accepted bidder have executed the contract or if no contract has been executed within thirty (30) days after the date of the opening of the bids, upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of his bid.

The right is reserved to reject any and all bids and to waive informalities.

W. A. GLASS,
Director, Department of Water and Sewers

U. S. Government

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation, Washington, D. C., June 15, 1945. Sealed bids (Specifications No. 1099 will be received at the office of the Bureau of Reclamation, Friant, California, until 10 a.m., July 18, 1945, and then publicly opened, for furnishing labor and materials and performing all work for the *construction of earthwork, concrete lining, and structures, station 6/10 to station 301/60, Friant-Kern Canal, Friant Division, Central Valley Project, California.* The work is situated near Friant, California. The principal items of work and the estimated quantities involved are as follows: 613,000 cubic yards of excavation, common, for canal; 767,000 cubic yards of excavation, rock, for canal; 166,000 station cubic yards of overhaul; 116,000 cubic yards of compacting embankments; 4,000 cubic yards of excavation, common, for drainage channels and dikes; 5,000 cubic yards of excavation, rock, for drainage channels and dikes; 3,200 cubic yards of excavation, common, for structures; 4,000 cubic yards of excavation, rock, for structures; 4,000 cubic yards of backfill; 2,000 cubic yards of compacting backfill; 1,100 cubic yards of compacting in backfill; 1,100 cubic yards of concrete in canal lining; 100 square yards of dry-rock paving; Preparing 143,000 square yards of rock foundations for concrete lining; Trimming 155,000 square yards of earth foundations for concrete lining; Placing 1,300,000 pounds of reinforcement bars; erecting 165,000 pounds of structural steel in bridge; and Erecting 75 M ft b.m. of timber structures. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be a part of the contract. The work shall be commenced within thirty (30) calendar days after date of receipt of notice to proceed and shall be completed within three hundred and sixty-five (365) calendar days from the date of receipt of such notice. Guarantee will be required with each bid in an amount not less than 10 percent of the amount of the bid. Performance bond will be required in an amount not less than 50 percent of the estimated aggregate payments to be made under the contract. Where the total amount payable by the terms of the contract is not more than $1,000,000, a payment bond will be required in the sum of one-half of the total amount payable by the terms of the contract. Where the total amount payable by the terms of the contract is more than $1,000,000 and not more than $5,000,000, the payment bond shall be in the sum of 40 percent of the total amount payable by the terms of the contract. Liquidated damages for delay will be two hundred dollars ($200) per day. Partial payments will be made monthly. (See article 16 of the contract.) No charge to prospective bidders for copies of the specifications and drawings; to others $2.00 per copy, not returnable. For particulars, address the Bureau of Reclamation, Friant, California; Denver 2, Colorado; or Washington 25, D. C.

William E. Warne,
Acting Commissioner.
(414)

Public Roads Administration, Federal Works Agency, Arlington, Virginia, June 23, 1945. SEALED BIDS will be received at the office of the Division Engineer, Public Roads Administration, 1440 Columbia Pike, Arlington, Virginia, until 10:00 o'clock A. M. E.W.T. July 12, 1945 for the construction of Project 1B1, Washington-Baltimore Parkway, located between Defense Highway and Riverdale Road, Prince Georges County, Maryland. The approximate quantities of the more important items are as follows: 65 acres Clearing and Grubbing; 715,500 cu. yd. Excavation; 9,000,000 sta. yd. Overhaul; 1,260 cu. yd. Cement Concrete; 7,300 lin. ft. Reinforced Concrete Culvert Pipe. Minimum rates of wages for laborers and mechanics on this project have been fixed by the Secretary of Labor as required by law. When plans and specifications are requested, a deposit of $10.00 cash or a certified check made payable to the Treasurer of the United States will be required to insure their return within 15 days after the opening of bids. Plans, specifications and proposal forms may be obtained at the address given above. H. J. Spelman, Division Engineer. (416)

(Additional Proposals on page 195)

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IS
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—to help you get what you want.
—to help you sell what you no longer need.
Take Advantage Of It
For Every Business Want
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PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS care publication New York, Chicago or San Francisco offices count as 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising rate is $7.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. E.N.R.

NEW ADVERTISEMENTS received by July 6th appear in July 12th issue subject to limitation of space available.

WANTED

ENGINEERS AND DRAFTSMEN

ELECTRICAL

MECHANICAL

STRUCTURAL

We have openings for capable engineers and draftsmen in the following branches of engineering—

ELECTRICAL—Industrial lighting, Power distribution, and Electronic applications.

MECHANICAL—Power plants, Heating systems, Process piping, Conveying systems, Plumbing, Sewers, Sprinkler work, and Precision machine design.

STRUCTURAL—Industrial buildings, Power plants, and Miscellaneous structures of steel and reinforced concrete.

Opportunities are in the West Coast, Cleveland, Chicago, New York and Gulf Coast areas.

Vital war plants important to the United States Government under high priority ratings.

Recent graduates will be considered.

Applicants must conform with Local War Manpower Regulations.

THE AUSTIN COMPANY

National Headquarters

16112 Euclid Avenue

CLEVELAND, OHIO

WANTED

Manager for our Machinery and Equipment Department Experienced with machinery and equipment used in heavy industries—like cranes, ground and overhead; steel buildings and structures, power plants, mining, contractors, etc. Drawing account and participation. Unusual opportunity for good high grade man. Confidences respected.

IRON & STEEL PRODUCTS, INC.

48 years' experience

13494 S. Brainard Avenue, Chicago 33 Ill.

"ANYTHING containing IRON or STEEL"

WANTED DESIGNING DRAFTSMEN

CIVIL and STRUCTURAL

For either industrial plant layout or general building design.

MECHANICAL

For layout of mechanical equipment and piping of chemical plant industrial buildings.

Give full experience, education, age, present salary and salary expected. Enclose snapshot.

Good post-war prospects.

Applicants must be able to obtain Statement of Availability.

E. I. du Pont de Nemours & Co., Inc.

Personnel Division

Wilmington 98, Delaware

WANTED

CONSTRUCTION ACCOUNTANTS PURCHASING AGENTS

Old established construction firm with large postwar program has openings for experienced construction accountants and field purchasing agents. Accountant must be capable of taking charge of and directing all accounting functions in project office including disbursements and payrolls. Purchasing agent must be familiar with procurement procedures, priorities, expediting and delivery of materials. Give full particulars as to age, experience, education, availability and salary desired.

P-422, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION ENGINEERS

Old, established consulting engineering and construction organization in New York City has good opportunities for construction engineers experienced in public utility and industrial construction work. Must be thoroughly qualified to direct field layout work, inspection work, preparation of construction reports and specifications for subcontracts; and to interpret plans and specifications. Reply must give full particulars as to age, education, experience record, availability, salary desired, etc. Please attach photograph.

P-333, Engineering News-Record
330 West 42nd Street, New York 18, N. Y.

POSITIONS VACANT

DRAFTSMEN-STRUCTURAL: Want detailers with several years experience detailing structural steel for industrial buildings. Give complete information such as experience, rate desired, etc. Location: Detroit. Must comply with W.M.C. requirements. P-390, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

FIRE PROTECTION Engineers and inspectors. Technical graduates, especially chemical and electrical; civil, mechanical, metallurgical also considered. Inspect and consult industrial plants to prevent fires, explosions, and other casualties. Considerable travel and report writing; interesting work offering permanency. Engineering experience necessary. Salary open. Well-known national organization with openings at Cleveland, Chicago and other district centers. Men under 34 years of age cannot be considered. Please send a photograph when applying. P-402, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

PERMANENT POSITION—Draftsman to learn detailing of frogs, switches, and track-work for mines and railroads. State age, experience, education and references. Must comply with W.M.C. regulations. West Virginia Steel and Manufacturing Co., P. O. Box 118, Huntington 6, West Virginia.

STRUCTURAL DETAILERS experienced on mill building and bridges. Steady work with overtime for good men. Summer Engineering Company, 239 4th Avenue, Pittsburgh, Pa.

WANTED: CONSTRUCTION Superintendent, one who has built hospitals for veterans administration. Civil engineer preferred, but this requirement not essential. P-425, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

DESIGNER, ESTIMATOR and draftsman—Shop fabricating structural and ornamental iron work, located in Norfolk, Va. Permanent job to right man. Give full details in first letter. P-426, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

DESIGNING ENGINEER experienced in designing dams, tunnels and covered concrete reservoirs. Write detailed letter stating experience, age, education and salary expected, and send references together with sample of work. Location Connecticut. P-427, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

BOOKKEEPER: CAPABLE of taking complete charge. General contractor in central New Jersey. Small office, pleasant surroundings, college town. Furnish complete information concerning self, experience, photo and salary desired. P-446, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

EXPERIENCED LORAIN truck crane operator wanted, must be familiar with repairs, steady all-year round position. Write P. O. Box 9, North Bergen, N. J.

GENERAL SUPERINTENDENT to take complete charge all field work for general contractor engaged in building construction. Please give age, experience, references and salary desired. Location Ohio. P-447, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

ESTABLISHED IOWA contractor has opening for general superintendent experienced in industrial, commercial and heavy construction work. Some knowledge of costs, purchasing and personnel direction desirable. State age, education, experience, references. P-450, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED STRUCTURAL steel detail draftsman and checkers, also reinforced concrete detail draftsman. Apply, giving age, experience and salary to start. Southern Engineering Co., Charlotte, N. C.

(Continued on page 176)

SEARCHLIGHT SECTION

WANTED

STRUCTURAL ENGINEERS AND DRAFTSMEN

Experienced Structural Engineers for design of steel and concrete building structures, foundations, etc., by an expanding organization with large volume of post-war construction now being designed. Capable men considered for field positions later. Architectural, structural and mechanical draftsmen also wanted. 48 hour week. In reply give full particulars including availability.

HARLEY, ELLINGTON AND DAY
Architects and Engineers
1507 Stroh Bldg., Detroit 26, Mich.

WANTED

Promotional Engineer

Established manufacturer has excellent opening for a graduate civil engineer with experience in the highway field, especially the design and construction of concrete pavements.

Applicants please write, stating age, education, experience record, and salary desired. Reply

P-437, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

POSITION OPEN:

Mechanic-Millwright with ability to handle men. Want to develop plant superintendents for small concrete products plants having good post war possibility. Age limit forty-five but prefer younger men. Operate on incentive or profit sharing plan.

P-383, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

WANTED

Chief—Mechanical Engineer

For hydraulic division wanted by midwest manufacturer. Competent to design and to direct engineering and development of high pressure hydraulic equipment for present and post war manufacture.

P-445, Engineering News-Record
520 North Michigan Ave., Chicago 11, Ill.

WANTED

GENERAL MANAGER

By central Ohio manufacturer of construction machinery equipment to direct sales, plant management, production, etc. When replying state experience, education, age, salary expected. Make reply as complete as possible and personal interview will then be arranged for those applicants with best qualifications.

P-442, Engineering News-Record
520 North Michigan Ave., Chicago 11, Ill.

Engineers
Draftsmen
Machine Designers

Wanted for work in Kingsport, Tenn. Openings available now for men experienced in the following:

Industrial Architecture
Electrical
Structural
Chemical Plant Piping
Textile Machinery
Process Equipment

Apply to: E. B. Cate
Industrial Relations Division
TENNESSEE EASTMAN CORP.
Kingsport, Tennessee
Must comply with WMC regulations

ENGINEERS
DESIGNERS
FOR
WAR WORK

STRUCTURAL

Engineers who are qualified to handle structural design of industrial buildings in both steel and reinforced concrete.

ELECTRICAL

Engineers who are qualified to do industrial power distribution and electrolytic work.

MECHANICAL

Engineers to lay out process equipment and piping, and all other mechanical equipment of industrial buildings and chemical plants.

War Manpower Regulations must be conformed with.

THE
H. K. Ferguson Co.
Hanna Bldg., Cleveland 15, Ohio

Structural & Concrete Designers

Experienced on
POWER & INDUSTRIAL PLANTS
Location NY City
EBASCO SERVICES INC.
2 Rector St. NYC 6

RESEARCH PHYSICIST

Ph.D. qualified to handle major development problem involving synthetic rubber. Position with nationally known manufacturer in their new and foremost research laboratory. In reply cover fully experience and education, give age and salary expected.

P-439, Engineering News-Record
520 North Michigan Ave., Chicago 11, Ill.

ENGINEERS

For design, detailing and supervision of construction of large bridges, including work on pneumatic caissons, by firm of Consulting Engineers. Location east and middle west. Write, stating age, education and experience.

P-444, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

SEARCHLIGHT SECTION

SEARCHLIGHT SECTION

ROCK DRILL DESIGNER

Experienced in designing and detailing of rock drills and pneumatic tools. Permanent position with large manufacturer in the east with good opportunities for advancement. All replies will be held confidential.

P-455, Engineering News-Record
330 West 42nd Street, New York 18, N. Y.

ENGINEERS

Top-flight resourceful men.

1 ME Machine Designer
1 EE Instrument Development

Write complete resume

Box ENR 7426, 113 W. 42d St., N. Y. C.

WANTED
DESIGN ENGINEER

Experienced in highways, drainage, small water supply and sewerage systems. Must be graduate civil engineer. Not over 50 years of age. Permanent position. Location, Cook County, Illinois.

P-441, Engineering News-Record
520 North Michigan Ave., Chicago 11, Ill.

SALARIED POSITIONS

This advertising service of 35 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY, INC.
272 Delward Bldg., Buffalo 2, N. Y.

A COURSE OF INSTRUCTION BY MAIL IN
STRUCTURAL ENGINEERING
Thirty-third Year

(In the following list, Courses A, B, and C are abbreviated from our complete Structural Engineering course).
A—Public Works Structures.
B—Architectural Engineering.
C—Special Course (State Board Exams. for P.E.)
D—Structural Engineering (complete).
E—Preparatory Course (for non-technical men).

Our Courses are offered principally to
ADULT CIVIL ENGINEERS AND ARCHITECTS

Ninety percent of our engineering students are former graduates (C.E.) from engineering colleges. Our courses have helped thousands of engineers to better positions, increased pay, and success "after forty".

Course B has helped many architects and draftsmen in passing the structural portion of State Board Examinations for license.

Literature sent without expense or obligation. Write TODAY.

WILSON ENGINEERING CORPORATION
College House Offices Harvard Square Cambridge, Mass., U. S. A.

BE A SUCCESSFUL BIDDER

The successful bidder is the man who bids the right price. A correct estimate is the foundation of any builder's success. A job taken too cheap results in a loss; a job bid too high is lost to a competitor. Whether you are a beginner or experienced in estimating, you can't afford to pass up this offer to examine the Tamblyn System of Estimating absolutely free.

This system is based on forty years of actual construction experience, and by its use you can estimate costs according to your local rates and conditions. Thousands have used it successfully during the twenty-five years it has been on the market. This year the course has been completely revised to help you get your share of the post-war business.

Study the course for ten days absolutely free. If you decide you don't want to keep it, just return it. Otherwise send us $5.00 and pay the balance of $25.00 at $5.00 per month, making a total of $30.00 for the complete course. Send us your name and address today, and we will send you plans, specifications, estimate sheets, a copy of the Building Labor Calculator, and complete instructions. What we say about this course is not important, but what you find it to be after you examine it is the only thing that matters. You be the judge, your decision is final.

TAMBLYN SYSTEM, Johnson Building EN, Denver 2, Colorado

POSITIONS VACANT
(Continued from page 174)

SURVEYMEN; INSTRUMENTMEN, chainmen, rodman, computers, topographic draftsmen, wanted for permanent, post-war work with old-established aerial mapping firm on control surveys in all parts of the U. S. State experience, age, draft classification, availability and starting salary expected. P-448, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

DESIGNING ENGINEER experienced in designing dams, tunnels and covered concrete reservoirs. Write detailed letter stating experience, age, education and salary expected and send references together with sample of work. Location Connecticut. P-449, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

STRUCTURAL DRAFTSMEN experienced in making shop drawings for all types of building work. Apply to L. D. Draper, Bethlehem Steel Company, Bethlehem, Pa., giving complete experience, education, nationality, and when available for work.

WANTED: A graduate chemist experienced in general highway chemical laboratory work, especially analyses of cement, paint and bituminous materials. Write H. C. Weathers, State Road Department, Gainesville, Florida.

WANTED: PAVING superintendent who has background of contracting experience. Must be able to estimate and construct work. P-454, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

BUILDING CONSTRUCTION superintendent experience covers 30 years and over 40 million dollars of various kinds of structures and further includes estimating, purchasing and general manager with reputable firms. PW-251, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

STRUCTURAL ENGINEER—High grade structural engineer, registered—Assoc. Mem. A.S.C.E., age 40, wide experience on design supervision and office procedure, bridges, wharves, piers, commercial, institutional and industrial buildings, steel plants, power houses, etc.; specialist in up to date design methods. Seeks opportunity for permanent connection with consulting engineers or architects engaged on high class work. PW-409, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

CIVIL ENGINEER, registered California, now located Mexico City, offers services in management for: water supply, industrial construction, technical investigations and reports, etc. PW-410, Engineering News-Record, 68 Post St., San Francisco 4, Cal.

POSITIONS WANTED

NAVAL OFFICER, 33, to be released this summer, Christian, married, child, excellent health, desires offer that will crystalize his future. Southern university graduate, sales engineering; above average positions two large corporations, large scale housing project, head small construction corporation, prefabrication research and interest; planner, organizer, speaker—knowledge of Latin America, including Spanish, Portuguese; recognizes his limitations. Confidential information respected. PW-418, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SUPERINTENDENT 54, thirty years experience roads, streets, sewers, etc. Desires position. Now located New York State. PW-428, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

GENERAL SUPERINTENDENT: One of the West's best qualified men. Experienced dates from 1920 in both supervision and management on dams, harbor work, dredging and bridges. PW-429, Engineering News-Record, 68 Post Street, San Francisco 4, Cal.

SUPERINTENDENT—Have 35 years experience supervising and building all phases of Federal, State, Cities and Counties Project, Airports, Highways, Bridges, Viaducts, Interceptor Sewers, Water Lines, Foundations and Flood walls, Heavy and Light Excavating. Familiar with all Government Project Construction. Qualification unquestionable. Organizer and estimator. Knows cost. Age 53 years. Best of references. PW-433, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

ELECTRICAL ENGINEER or superintendent considerable experience in light and power utilities. Last four or five years in industrial work. W. C. Billings, 904 North George St., Rome, N. Y.

CIVIL ENGINEER: Major, corps of engineers, M. Am. Soc. C. E., recently released from Army as Major, General Staff; age 45; married; graduate; registered Illinois and Pennsylvania; four years service in key executive operational engineer assignments overseas; specialist in buildup of engineer organizations; 25 years extensive varied experience in planning, study, design, construction, contracting, sales; in structural, architectural, construction, sales, engineering; importing, foreign construction; foreign research. Two years valuable construction experience China; several years prewar Europe and recently. Speaks good French; experienced in French methods and administrative procedure. Excellent record; best technical and personal references. Desires contact progressive manufacturer with view to permanent connection as sales engineer or field engineer, construction equipment, building or architectural products. PW-451, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS WANTED

CONSTRUCTION SUPERINTENDENT: Power house, industrial plants deep foundation, mass and reinforced construction, broad experience. PW-411, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONTRACTOR ENGINEER: Graduate, 20 years wide experience, building and general construction, including negotiating, purchasing, estimating. Salary $100 per week. PW-412, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

OFFICE MAN, 38, ten years domestic and foreign work construction auditor office-manager prefer long-term project in climate healthful for children. J. J. Quirk, 9 Francis Avenue, Ambler, Pa.

GENERAL CONSTRUCTION Superintendent, over twenty-five years experience in all types of building construction desires position with reliable construction firm, available immediately for Chicago and vicinity. PW-407, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

WORK WANTED

EQUIPPED SURVEY PARTIES for all types of survey or construction work. Any location. Surveyor's equipment purchased. Harwood, 258 Broadway, New York City.

SALESMEN WANTED

WANTED YOUNG structural, industrial or civil engineer with sales ability is offered a sales opportunity in Metropolitan area with an old established firm in the building materials field. State age, detailed account of experience and qualifications. Include photograph. Veteran preferred. SW-308, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SALESMAN WANTED in central N. Y. state by long established distributors of well known construction, industrial and highway equipment. Liberal commissions. Sales ability, automobile and knowledge of machinery necessary. Excellent future in fine territory for capable man. SW-452, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

(Continued on opposite page)

ENGINEERING & DESIGN

Qualified services available within 200-mile radius of Ft. Wayne, Ind., for large or small projects requiring structural, architectural, or process piping work; estimating, appraisals, etc. Excellent background in industrial building, power plant & sewage disposal projects.

WW-440, Engineering News-Record
520 North Michigan Ave., Chicago 11, Ill.

SALESMEN WANTED
(Continued from opposite page)

SALES ENGINEER—Pump and air compressor line. M. E. Graduate, age 27 to 32. 3 years sales experience. Permanent connection. Central Ohio. SW-416, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

REPRESENTATIVES AVAILABLE

SALES ENGINEER: Man with 20 years experience in steel and steel products in Phila. territory, last 12 years warehousing steel wire, wishes connection either as sales representative or manufacturers agent. Warehouse space available. RA-311, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

AVAILABLE SALES representative: Services of sales executive with vast business experience are available as New York representative. Has large acquaintance with engineering and contracting firms and with leading industries. RA-453, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

FOR RENT

CALCULATING MACHINES and adding machines, all makes. F. W. Finch, 512 Pennsylvania Bldg., Philadelphia, Penna.

ONE ENGINEERS TRANSIT and one 18 inch Wye level for rent. $5.00 per month each. Daniel McFarland, 624 Second Ave., San Francisco.

PATENTS ATTORNEYS

PATENTS, TRADE MARKS, booklet, "General Information Concerning Inventions and Patents and Free Schedules" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 454, 815 15th St., N. W., Washington, D. C.

WANTED

TRANSITS AND LEVELS accurately repaired, also bought, sold or rented; quickly, first class service. Griner, 903 Grand Ave., Kansas City, Mo.

ANYTHING within reason that is wanted in the field served by Engineering News-Record can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

SALES MANAGER
HEAVY ON CONTRACT SALES
Sheetmetal-Radio Field
E.E. or M.E. Background Desirable
Excellent Salary
and Bonus Arrangement
Must be able to aid in the future development
IN OUR POST-WAR PROGRAM
Firm Established in 1888
Write Full Resume to
Box 7272, Equity,
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MACOMBER
STRUCTURAL
BUILDING PRODUCTS
PRESENT
OPPORTUNITY FOR
ESTABLISHED ENGINEERING
SALES AGENCIES
There Are Some Open Territories — Write.
MACOMBER
INCORPORATED
CANTON 1, OHIO

Tennessee Valley Authority

PUBLIC AUCTION

CONSTRUCTION MATERIALS AND SUPPLIES

(NEW AND USED)

STARTING

TUESDAY JULY 17, 1945

10 A.M. (CWT)

AT

WATTS BAR DAM

NEAR SPRING CITY, TENNESSEE

Material to be auctioned consists of:

Bolts
Nuts
Screws
Washers
Conduit
Fuses
Paint
Fittings, Etc.
Miscellaneous Construction Materials
Condulets
Couplings
Electric Wire and Cable
Brake Lining
Pipe
Files
Reflectors
Hand Tools
Transformers
Wire Rope
Manila Rope
Valves
Packing

MANY ITEMS IN ORIGINAL PACKING

The above Materials will be sold in accordance with the terms of sale distributed at the auction and with War Production Board and Office of Price Administration regulations. Payment shall be made within 10 days from date of sale by cashier's or certified check, payable to the Tennessee Valley Authority. Material may be removed upon payment and must be removed within 30 days from date of sale.

The Authority reserves the right to withdraw any item or items from sale before the auction is complete, in the event the amount bid on such item or items is inadequate in the judgment of the Authority.

Material may be inspected on any weekday, between 8:00 A.M. and 3:00 P.M. See W. M. Cox, Watts Bar Dam Warehouse near Spring City, Tennessee. For further information, write the Sales and Transfer Section, Tennessee Valley Authority, Old Post Office Building, Knoxville, Tennessee.

TENNESSEE VALLEY AUTHORITY

Materials Division

SALESMAN WANTED

in Central N. Y. State by long established Distributors of well known Construction, Industrial and Highway Equipment. Liberal commissions. Sales ability, automobile and knowledge of Machinery necessary. Excellent future in fine territory for capable man. Address

SW-384, Engineering News-Record, 330 West 42nd St., New York 18, N. Y.

VENEZUELA

ACCOUNTS SOLICITED

For Distribution of Construction Machinery and Equipment

CARLOS TEJERA
Jabillos, Florida, 26
CARACAS

Drawings Made & Checked we can handle additional detailing and checking drawings for structural steel and Mics. and Orn. Iron work.

C. L. FIELDER COMPANY
Roanoke, Va.

UNIVERSAL TOOLS! NATIONALLY ADVERTISED BRANDS AND PRICES. If it's Tools —We have it, Can get it, or it isn't made! PRICE LIST & ORDER BLANK FREE!!
UNIVERSAL TOOL COMPANY
C. B. Demattels, President
1527 Grand ENR, Kansas City, Mo.
IMMEDIATE SHIPMENT: OVERNIGHT BY AIR: TO ANYWHERE—USA.

LAND SURVEYORS NOTE!
A *Prize Competition* for the best paper on "The Use of Plane Coordinates in Land Surveying" is being sponsored by the AMERICAN CONGRESS ON SURVEYING AND MAPPING. For details, write to
P. O. Box 470, Benjamin Franklin Station, Washington 4, D. C.

IMMEDIATE DELIVERY!
1,000,000 Feet New & Reconditioned
WIRE ROPE *For Every Purpose*
All sizes from ¼" to 1½"
ALWAYS BUYING USED WIRE ROPE
WIRE ROPE TRADING CO.
"World's Largest Dealers in Used Wire Rope"
560-562 10th Ave. N. Y. 18, N. Y.
LONGACRE 3-3050-1-2

(Additional Auction Advertisement on page 179)

SEARCHLIGHT SECTION

WANTED
ONE LOW BED SEMI TRAILER
20 to 30 ton capacity equipped with 15" tires.
GRAND EXCAVATORS CO., INC.
331 Franklin Ave. Hewlett, L. I.

SEARCHLIGHT SECTION

(Advertisers in this issue)

A.C. Contractors Mchy., Inc. 186
Air Compressors Rental Co. 182
Albert & Davidson Pipe Co. 191
Albert Pipe Supply Co., Inc. 191
American Air Compressor Corp. 188
American Envelope Co. 189
American Sales Co. 191
Avery, O. B. 182, 184, 186
Baron Steel Co. 178
Bendix Machinery Co., Inc. 180, 184, 186, 189
Benney Equipment Co., R. H. 189
Bernstein Bros. 192
Brown Bevis Equip. Co. 186
Buff 179
Caine Steel Co. 192
Carlyle Rubber Co., Inc. 184
Ciampi & Son, Inc. 187
Clapp-Riley & Hall 180
Clarendon & Pittsfield R. R. Co. 188
Colonial Pipe and Supply Corp. 191
Complete Mach. & Equip. Co., Inc. 181
Corbisette, N. R. 190
Corson, Inc., G. & W. H. 190
Crowley-Duers Co. 187
Dickerson Co. 190
Dierks Lumber & Coal Co. 178
Dreifus Co., Charles 181
Duke Equipment Co. 178
Dulein Steel Products Co. 192
du Pont de Nemours & Co., Inc. 174
Ebasco Services, Inc. 175
Economy Co., Inc. 185, 187, 189, 190
Elphinstone Co., Inc. 180
Equipment Corp. of America 181, 188
Erman-Howell & Co. 182
Fielder Co., C. L. 177
Finn Co., N. A. 190
Ford & Co. 192
Foster Co., L. B. 191, 192
Frank, M. K. 192
Garson Iron & Steel Co. 178, 188
Goodrich Co., B. F. 178
Grand Excavators Co., Inc. 178
Graf-Apsco Co. 179
Greenburg Machine Co. 184
Greenpoint Iron & Pipe Co. 191
Greenspon's Son Pipe Corp., Jos. 191
Guion, H. P. 180
Gutherie & Co., Inc., A. 189
Hickerson, R. D. 179
Hoch, Charles H. 190
Hopia, J. 190
Hoppe, Clemens B. 191
Hyman Michaels Co. 192
Imperial Coal Co. 178
Industrial Equip. Corp. 184
Industrial Plants Corp. 186
Ingersoll Co., The Chas. M. 186
International Hoist & Machine Co. 186
Instrument Sales 179
Iron & Steel Products Co. 174, 187
Kenney, G. C. 192
Koch, Karl 190
Konnight, Mary E. 190
Le Fevre Co., Harvey 194
Lewis, Harry C. 117
Lorenz Equip. Co. 188
MacNeal, Donald B. 186
Macomber, Inc. 177
Mann, Co., S. 188
McAllister, M. L. 179
Midwest Steel Corp. 192
Mississippi Valley Equip. Co. 184, 192
Missouri Petroleum Products Co. 188
Morlock, Chas. 191
Moths Co., Ray J. 192
National Blue Print Co. 179
New England Equipment Co. 189
Nixon-Hasselle Co., Inc. 191
Olson, E. M. 178
O'Neill, A. J. 180
P & C Contractors Co., Inc. 190
Portsmouth Equipment Rentals 186
Rail & Industrial Eq. Co. 191
Reith-Riley Constr. Co. 188
Roberts, E. A. 191
Sack Brothers 192
Santucci Constr. Co. 192
Schoonmaker Co., A. G. 182
Schoonmaker, Robert 186
Schultz Contracting Co., John B. 190
Service Supply Corp. 182
Shannon & Co., J. Jacob 186, 188
Smith, Inc., L. B. 180, 183
Somerset Const. Co. 188
Stanhope, L. M. 180
Stanhope, Inc., R. C. 187
Stiers Constr. Co. 191
Stone 182
Swabb Equipment Co., Frank 178
Tennessee Eastman Corp. 175, 178
Tennessee Valley Authority 177, 179
Thomas Hoist Co. 190
Telonelly Sons, E. 192
Tractor & Equipment Co. 187
Tunick Bros. 189
Union Bldg., & Const. Corp. 188
United Foundation Corp. 178
United Hoisting Co., Inc. 180
Universal Tool Co. 177
Vulcan Iron Works 187
Wallace, B. F. 188
Walsh Co., Richard P. 180
Walsh, J. T. 182, 184, 186
Warren-Knight Co. 179
Weiss Co., B. M. 180
Wilson Engineering Co. 176
Wing & Son Corp., R. B. 182
Wire Rope Trading Co. 176
Wiwoco Equip. Corp. 178
Wylie Stewart Mchy. Co., Inc. 184

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3/4 to 4 yard
SHOVELS
2 to 8 yard
DRAGLINES
FRANK SWABB EQUIPMENT COMPANY
Hazleton, Pa. Telephone 3906

WANTED
STEEL BUILDING
Approx. 75 ft. x 200 ft.
With Over-Head Traveling Crane
Must be priced right
BARON STEEL COMPANY
TOLEDO 12, OHIO

WANTED
Gasoline and Diesel Shovels also Caterpillar Tractors and Construction Equipment of all kinds.
DUKE
EQUIPMENT CO.
297 DUKE ST., MONTREAL, CANADA

WANTED
2 or 2½ cu. yd. Shovel for Coal Stripping, with long stick and boom. Diesel preferred. State full price, condition, location for inspection.
IMPERIAL COAL COMPANY
Dean, Ohio

WANTED
Cement Guns and Equipment
E. M. OLSON
213 State St. Detroit 26, Mich.

WANTED
DIESEL ENGINES
Total 1600 HP required, with or without Generators. Consider units 225 HP and larger. Also smaller high speed units for standby service. Preference given units immediately available. Give complete details and price.
W-344, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

WANTED
ELECTRIC HOIST & DERRICK
2 Ton 100 to 115 ft. boom, Stiff Leg with 3 drum electric hoist and electric swinger.
W-420, Engineering News-Record
330 West 42nd Street, New York 18, N. Y.

WANTED TO PURCHASE
One or two P&H 250 A or B Truck Crane or equal. Capacity 5300 lbs. at 35 ft. radius, 40-45 ft. boom with outriggers, for clam shell service. Ten-wheel chassis, good condition, independent boom hoist. Advise serial number, location, price.
THE B. F. GOODRICH CO.
E. G. Hammack, 500 S. Main St., Akron, O.

Wanted for Immediate Purchase
Equipment for a Central Concrete Mixing Plant
1—4 compartment 200 ton Aggregate and Cement Bin.
1—2 cu. yd. Batcher with Aggregate and Cement Scale, semi-automatic control.
1—300 bbl. per hr. Cement Elevator with 20' horizontal track screw.
1—Water Weight Batcher or Meter.
1—2 yd. Concrete Mixer.
1—24" x 80' Belt Conveyor.
1—18" x 200' Belt Conveyor.
TENNESSEE EASTMAN CORP.
Kingsport, Tennessee

WANTED FOR EXPORT
In perfect condition
STEAM SHOVEL with Pile Drive attachment
4 CATERPILLAR TRACTORS 85 HP each
2 SCRAPERS 11cb. yards
1 TRAILBUILDER
1 RIPPER
1 PLAINER
Several CONCRETE MIXERS 7-10 cb. feet
WIWOCO EQUIPMENT CORP.
76 Beaver Street, New York 5, N. Y.

WANTED
LATE MODELS
Used Crawler Tractors
Prefer International, Models TD6, TD9, TD14, TD18 with bullgraders or bulldozers or Caterpillars Models D2, RD4, D4, RD7, D7, RD8, D8 with dozers. Must be A1 condition. Will pay attractive prices. Can also use ½-yard, ¾-yard and 1½ yard late model shovels, draglines.
Phone, write or wire:
GARSON IRON AND STEEL CO.
512 Lyceum Bldg. Duluth, Minn.
Melrose-222

WANTED IMMEDIATELY
4—Cranes (Crawler) ¾ or 1 yd. or 1 1¼ yd. with clam-shells, and one Backhoe attachment (Diesel or gas.)
Preferably near Newport News, Va. area.
UNITED FOUNDATION CORPORATION
680 Lexington Rd., Union, N. J.
Unionville 2-4257

WANTED—Speeder Combination
LOADER OR SHOVEL
on RD-6 Caterpillar tractor.
Dierks Lumber & Coal Co.
Dept. LG
1006 Grand Ave. Kansas City 6, Mo.

BULLDOZER WANTED
D8 or D7 or D18. Must be in good condition. Will pay Cash.
State Price and Location
IMPERIAL COAL COMPANY
Dean, Ohio

Tennessee Valley Authority

PUBLIC AUCTION

CONSTRUCTION MATERIALS AND SUPPLIES

(NEW AND USED)

STARTING
TUESDAY JULY 10, 1945
10 A.M. (CWT)

AT

PARIS, TENNESSEE C & M WAREHOUSE

AND CONTINUING

THURSDAY JULY 12, 1945

AT

KENTUCKY DAM
GILBERTSVILLE, KENTUCKY

Material to be auctioned consists of:

Bolts	Miscellaneous Construction Materials	Insulators
Nuts	Hollow Drill Steel	Reflectors
Screws	Grinding Wheels	Sheaves
Washers	Electric Wire and Cable	Hand Tools
Conduit	Safety Switches	Snow Fence
Dies	Pneumatic Tools	Fittings
Pipe-Brass-C.I.-Steel	Detachable Bits	Welding Rod
Valves	Steel Shapes, Bars, Plates, Sheets	

ALSO

MISCELLANEOUS BUILDINGS

BUILDING AUCTION WILL START AT 10:00 A.M. CWT JULY 13, 1945

MANY ITEMS IN ORIGINAL PACKING

The above Materials will be sold in accordance with the terms of sale distributed at the auction and with War Production Board and Office of Price Administration regulations. Payment shall be made within 10 days from date of sale by cashier's or certified check, payable to the Tennessee Valley Authority. Materials may be removed immediately upon payment and must be removed within 30 days from date of sale.

The Authority reserves the right to withdraw any item or items from sale before the auction is complete, in the event the amount bid on such item or items is inadequate in the judgment of the Authority.

Material may be inspected on any weekday, between 8:00 A. M. and 3.00 P. M. For Paris materials, see W. E. Jenkins, C. & M. Warehouse, Paris, Tennessee. For Kentucky Dam materials and buildings, see G. P. Jessup, Project Manager, Kentucky Dam.

For further information, write the Sales and Transfer Section, Tennessee Valley Authority, Old Post Office Building, Knoxville, Tennessee.

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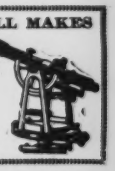

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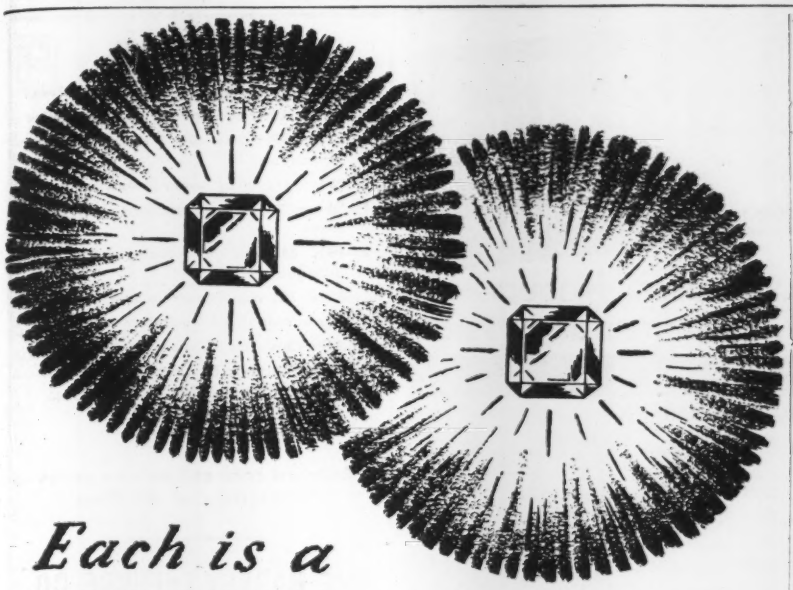

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(Continued on page 195)

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OFFICIAL PROPOSALS

(Continued from page 173)

U. S. GOVERNMENT

Public Roads Administration, Federal Works Agency, Arlington County, Virginia, June 23, 1945. SEALED BIDS will be received at the office of the Division Engineer, Public Roads Administration, 1440 Columbia Pike, Arlington, Virginia, until 10:00 o'clock A. M. E.W.T. July 10, 1945 for Project VA DA-NR 77, resurfacing or the easterly end of Colonial National Monument near Yorktown, Virginia. Approximately 850 tons of Type H-1 Cold Asphalt, Concrete Pavement, Liquefier Type will be required. Minimum rates of wages for laborers and mechanics on this project have been fixed by the Secretary of Labor as required by law. When plans and specifications are requested, a deposit of $10.00 cash or a certified check made payable to the Treasurer of the United States will be required to insure their return within 15 days after the opening of bids. Plans, specifications and proposal forms may be obtained at the address given above. H. J. Spelman, Division Engineer. (415))

OFFICIAL PROPOSALS

Bids: July 18. (411)

Bridge Substructure

MISSISSIPPI RIVER HIGHWAY BRIDGE
AT
MEMPHIS, TENNESSEE—CRITTENDEN COUNTY, ARKANSAS
MAIN BRIDGE SUBSTRUCTURE
PROJECT NO. SN-A-SN-U-FAP 607-A(2), PART 1.
TENNESSEE—ARKANSAS

Sealed duplicate proposals will be received by the Department of Highways and Public Works of Tennessee and the Arkansas State Highway Commission, jointly, at Room 107, Courthouse at Memphis, Tennessee, until 10:00 a.m. Central War Time on July 18, 1945, for the construction of Tennessee-Arkansas Project No. SN-A-SN-U-FAP 607-A(2), Part 1, consisting of the Memphis abutment and the seven main piers of a highway bridge over the Mississippi River, between Memphis, Tennessee and Crittenden County, Arkansas, and will be publicly opened and read immediately thereafter in the City Council Chamber in the Courthouse, Memphis, Tennessee.

The work to be performed under this contract will consist principally of the construction on the Memphis bank of a stone-faced abutment anchorage and connecting retaining walls, the construction of four pneumatic caisson founded stone-faced main river piers in the navigable section of the river, and the construction of three caisson founded stone-faced piers on the Arkansas bank, all of which support the main superstructure over the Mississippi River, as shown on the contract plans.

Bidders will be required to file with their bids duplicate financial, equipment and experience questionnaire forms made out in detail, which forms will be furnished with bid blanks.

A bidder's bond in duplicate in the amount of $250,000.00, payable jointly to the Department of Highways and Public Works of Tennessee and the Arkansas State Highway Commission on the forms furnished with the proposal, will be accepted by the States only from a surety or sureties qualified to do business both in Tennessee and Arkansas and holding certificates of authority from the United States Treasury Department and conforming to the limitations of the last published Treasury statement on acceptable sureties.

Plans, specifications and contract documents, together with forms, questionnaires and necessary information, are open to public inspection at the offices of the Department of Highways and Public Works of Tennessee, Nashville, Tennessee, and the Arkansas State Highway Commission, Little Rock, Arkansas, and of Modjeski and Masters, Engineers, State Street Building, Harrisburg, Pennsylvania, and at Room 107, Courthouse, Memphis, Tennessee, and may be secured from Modjeski and Masters, Engineers, State Street Building, Harrisburg, Pennsylvania, upon a deposit of $20.00 per set.

A refund of $10.00 per set will be made by Modjeski and Masters upon the return in good condition to them of the copy so obtained.

The War Production Board has issued authorization for construction and assigned Allotment Symbol F-6 and Preference Rating AA-3 for this project, however the approval of this project will not be construed as justification for application to the War Production Board or the Office of Defense Transportation for new additional or new replacement construction equipment of the following types needed for completion of the project; crawler shovels, drag lines, cranes, truck cranes, crawler tractors, and tractor attachments, motor graders, all classes of trucks, truck tractors, truck trailers.

Before the execution of the contract the successful bidder will be required to be authorized to do business in and to be licensed in both the State of Tennessee and the State of Arkansas.

No bid may be withdrawn after having been deposited or filed.

The right is reserved to reject any or all bids and to waive all technicalities.

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Alco Products Div. of American Locomotive Co. ... 166
Allied Structural Steel Companies ... 99
Aluminum Co. of America ... 14
American Lumber & Treating Co. ... 102
Armco Drainage Products Assn. ... 2nd Cover
Armstrong Bros. Tool Co. ... 142
Associated General Contractors of America, Inc. ... 172
Athey Truss Wheel Co. ... 13
Atlas Powder Co. ... 18
Austin-Western Co. ... 11

Bailey Meter Co. ... 152
Baldwin Locomotive Works, The ... 131
Barber-Greene Co. ... 139
Barco Mfg. Co. ... 117
Beebe Bros. ... 128
Belmont Iron Works ... 153
Bethlehem Steel Co. ... 2, 165
Blaw-Knox Div. of Blaw-Knox Co. ... 140, 152
Brandt, Inc., Charles T. ... 167
Briggs Clarifier Co. ... 106
Broderick & Bascom Rope Co. ... 29
Bucyrus-Erie Co. ... 127
Byers Co., A. M. ... 5
Byers Machine Co., The ... 142

Caterpillar Tractor Co. ... 16, 17
Ceco Steel Products Corp. ... 47
Cement Gun Co. ... 120
Chain Belt Co. ... 154
Chicago Bridge & Iron Co. ... 156
Cities Service Oil Co. ... 123
Cole Mfg. Co., R. D. ... 160
Commercial Shearing & Stamping Co., The ... 144
Complete Machinery & Equipment Co. ... 167
Contractors Machinery Co., Inc. ... 100

Darling Valve & Mfg. Co. ... 141
DeLaval Steam Turbine Co. ... 153
Delaware Bay Shipbuilding Co., Inc. ... 138

Dobbie Foundry & Machine Co. ... 153
Dravo Corp. ... 150
DuPont DeNemours Inc., E. I. ... 36

Earle Gear & Machine Co., The ... 138
Eberhard Faber Pencil Co. ... 112
Electric Tamper & Equipment Co. ... 104
Elliott Co., B. K. ... 153
Eppinger and Russell Co. ... 152
Erie Steel Construction Co. ... 113
Euclid Road Machinery Co., The ... 7

Fielder Co., C. L. ... 153
Flexible Steel Lacing Co. ... 196
Ford Motor Co. ... 46
Fort Pitt Bridge Works ... 45
Friden Calculating Machine Co. ... 146

Gardner-Denver Co. ... 125
Gar Wood Industries, Inc. ... 103
General Motors Corp. (Hyatt Bearings Div.) ... 121
Giles Drilling Corp., The ... 152
Golden-Anderson Valve Spec. Co. ... 118
Gray Co., Inc. ... 114
Griffin Wellpoint Corp. ... 124
Gunite Concrete & Construction Co. ... 110

Haiss Mfg. Co., Inc. George ... 4
Harcourt Brace & Co. ... 158
Harnischfeger Corp. ... 153
Hayward Co., The ... 136
Hendrick Mfg. Co. ... 152
Hines Lumber Co., Edward ... 32
Hooper & Sons Co., Wm. E. ... 43
Hunt Machine Co. Rodney ... 150

Imperial Pencil Tracing Cloth ... 134
Industrial Brownhoist Corp. ... 120
International Harvester Co. ... 31
Irving Subway Grating Co., Inc. ... 128
Iowa Manufacturing Co. ... 109

Jaeger Machine Co., The ... 9
Jenkins Bros. ... 21
Johns-Manville Corp. ... 40, 41
Johnson Co., The C. S. ... 126

Karl Koch Erecting Co., Inc. ... 172
Keasby & Mattison Co. ... 119
Keuffel & Esser Co. ... 44
Kinnear Mfg. Co. ... 162
Koehring Co., The ... 147
Koppers Co. ... 8

LaPlant-Choate Mfg. Co. ... 25
Laughlin Co., The Thomas ... 138
Leadite Company, The ... 157
Lewis & McDowell, Inc. ... 130
Lima Locomotive Works, Inc. ... 137
Lincoln Electric Co., The ... 34, 35
Linde Air Products Co., The ... 6
Lock Joint Pipe Co. ... 105
Lone Star Cement Co., Inc. ... 48
Lowell Wrench Co. ... 124
Lufkin Rule Co. ... 158

MacArthur Concrete Pile Corp. ... 136
Macmillan Petroleum Corp. ... 22
Mall Tool Co. ... 136
Marine Diving Service ... 172
Marchant Calculating Machine Co. ... 168
Marion Steam Shovel Co. ... 37
Master Builders Co., The ... 33
McCaffrey-Ruddock Tagline Corp. ... 132
McGraw-Hill Book Co., Inc. ... 148
McKiernan-Terry Corp. ... 153
Michigan Power Shovel Co. ... 3rd Cover
Morrison Railway Supply Corp. ... 170
Mott Core Drilling Co. ... 130
Mount Vernon Bridge Co., The ... 136
Mueller Brass Co. ... 115
Mueller Co. ... 169
Murdock Mfg. & Supply Co., The ... 162
Murphy Diesel Co. ... 133

National Gunite Corp. ... 138
National Lead Co. ... 12
Nicholson Co. ... 171
Northwest Engineering Co. ... 3

Ohio Locomotive Crane Co., The ... 152
Otis Elevator Co. ... 42
Owen Bucket Co., The ... 164

Pennsylvania Drilling Co. ... 153
Pittsburgh Des-Moines Steel Co. ... 168
Pittsburgh Equitable Meter Co. ... 28
Portland Cement Association ... 116
Preformed Wire Rope Manufacturers ... 145
Preload Corp., The ... 148
Pressure Concrete Co. ... 152
Proportioneers, Inc. ... 122

Railway Express Agency, Air Express Div. ... 126
Raymond Concrete Pile Co. ... 101
Reo Motors Ins. ... 159
Reznor Mfg. Co. ... 170
Rogers Bros. Corp. ... 152
Ryerson & Son, Inc., Jos. T. ... 157

Sauerman Bros, Inc. ... 144
Shell Oil Co. ... 97
Sika Chemical Corp. ... 164
Smit & Sons, Inc., J. K. ... 39
Smith Corp., A. O. ... 111
Smith Engineering Works ... 23
Sparkling, R. W. ... 132
Spencer, White & Prentis, Inc. ... 160
Sprague & Henwood, Inc. ... 150
Stacey Bros. Gas Construction Co. ... 166
Standard Steel Corp. ... 108

Texas Company, The ... 4th Cover
Thomas Hoist Co. ... 167
Timber Engineering Co., Inc. ... 151
Timber Structures, Inc. ... 129
Timken Roller Bearing Co., The ... 24
Torrington Co., Bantam Bearings Div. ... 163
Trackson Co. ... 20
Truscon Steel Co. ... 50
Tyson Bearing Corp. ... 30

Underpinning & Foundation Co., Inc. ... 166
Union Carbide & Carbon Corp. ... 6
Union Metal Mfg. Co., The ... 135
Unit Crane & Shovel Corp. ... 130
United States Rubber Co. ... 15
U. S. Pipe & Foundry Co. ... 143
U. S. Steel Corp. Subsidiaries ... 52
Universal Atlas Cement Co. ... 52
Universal Form Clamp Co. ... 19

Viber Company ... 142
Vulcan Iron Works ... 162

Wallace & Tiernan Co. ... 10
Ward LaFrance Truck Div. General American Industries, Inc. ... 38
Wellman Engineering Co. ... 110
Western Concrete Pile Corp. ... 130
Western Foundation Co. ... 130
Westinghouse Electric Corp. ... 26, 27
White Co., David ... 172
White Manufacturing Co. ... 124
Wickwire Spencer Steel Co. ... 161
Willson Products, Inc. ... 134
Wooldridge Mfg. Co. ... 107

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Auctions ... 177, 179
Business Opportunities ... 177
Employment ... 174, 177
Bixby, Inc., R. W. ... 176
Instruction
Tamblyn System ... 176
Proposals ... 172, 173, 195
Schools ... 176
Wilson Engineering Co. ... 176
Used Equipment, General ... 177, 192
FOR RENT ... 190
PILING ... 192
PIPE ... 191
Rail ... 192
SURVEYING INSTRUMENTS ... 179
WANTED ... 178

Index of advertisers ... 178

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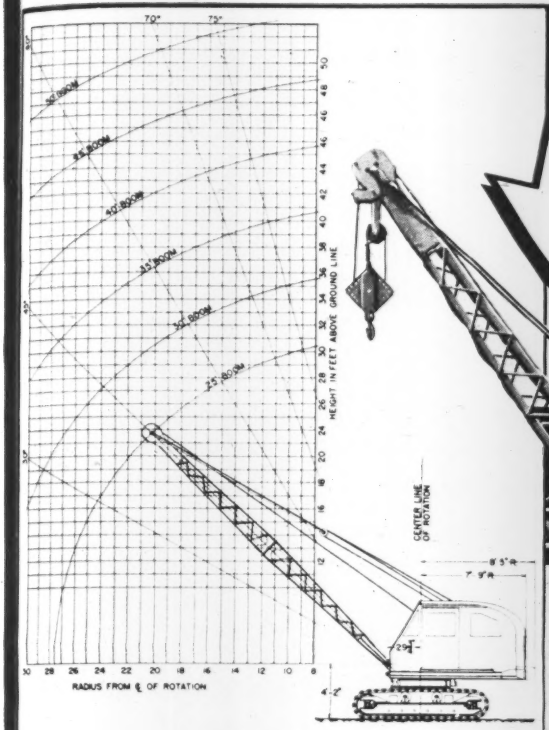
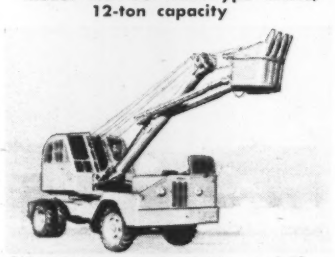


MODEL C-16
CRANE CAPACITY CHART

Boom Length	Radius In Feet	Standard C'Weigth	1000 lb. Extra C'Weigth	2000 lb. Extra C'Weigth	1400 lb. Rear C'Weigth	Rear C'wt. -1000 lb. C'Weigth	Rear C'wt. -2000 lb. C'Weigth
25 ft. Boom	10	12,550	14,000	15,500	14,700	16,200	18,000
	12	9,580	10,750	11,900	11,290	14,740	13,500
	14	7,780	8,680	9,600	9,120	10,020	11,400
	16	6,530	7,280	8,000	7,660	8,420	9,200
	18	5,620	6,270	6,900	6,610	7,260	7,900
	20	4,950	5,550	6,100	5,810	6,380	6,900
	22	4,420	4,920	5,400	5,180	5,690	6,200
	25	3,780	4,230	4,700	4,460	4,900	5,300

Model TLDT-20 Truck-type Crane, 12-ton capacity



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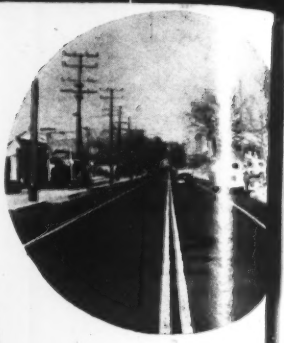

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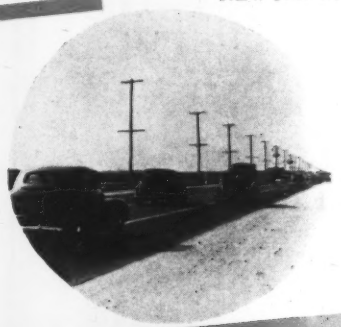
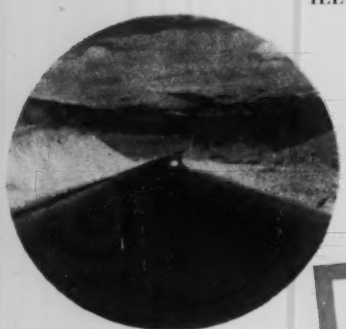


ILLINOIS



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